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Zazopoulos, Emmanuel
Staffa, Alfredo

<120> GENE CLUSTER FOR RAMOPLANIN BIOSYNTHESIS

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Phe Gln Trp Ile Glu Ser Ala Leu Tyr Leu Ala Leu Gly Gly Leu Leu
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Leu Ala Val Gly Leu Trp Arg Ile Arg Arg His Val Ile
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 <211> 304
 <212> PRT
 <213> Actinoplanes sp.

<400> 3

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Pro Arg Gly Arg Val Ile Gly Leu Val Gly Pro Asn Gly Ala Gly Lys
 35 40 45

Ser Thr Leu Leu Gln Leu Ala Cys Gly Leu Ile Thr Pro Ser Glu Gly
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Ser Leu Arg Val Leu Gly Glu Thr Pro Ala Ala Asn Ala Gly His Leu
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Ala Lys Val Gly Phe Val Ala Gln Asp Thr Pro Val Tyr Ser Asn Phe
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Thr Val Gly Asp His Leu Lys Met Gly Ala Lys Leu Asn Pro Thr Trp
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Asp Gln Ala Leu Ala Glu Arg Arg Val Ala Gln Val Gly Leu Asn His
 115 120 125

Gly Gln Lys Ala Gly Arg Leu Ser Gly Gly Gln Arg Ala Gln Leu Ala
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Leu Thr Leu Ala Ala Ala Lys Arg Pro Glu Leu Leu Met Phe Asp Glu
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Pro Ala Ala Ala Leu Asp Pro Leu Ala Arg Asp Gly Phe Leu Gln Asn
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Leu Leu Glu Phe Val Thr Glu Leu Asp Ala Ser Ala Ile Leu Ser Ser
 180 185 190

His Leu Leu Gly Asp Val Glu Arg Val Cys Asn Tyr Leu Ile Val Leu
 195 200 205

Cys Ala Ser Arg Val Gln Val Ala Gly Asp Val Pro Asp Leu Leu Asn
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Thr His Tyr Arg Ile Val Ala Pro Arg Gly Glu Leu Asp His Pro Pro
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Ala Gly Leu Glu Val Ile Arg Ala Gln His Ala Asp Arg Tyr Thr Thr
245 250 255

Ala Val Val Arg Gly Asp Gly Ser Arg Pro Ser Thr Trp Thr Ile Glu
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Pro Ile Gln Leu Glu Glu Leu Val Leu Ala Tyr Met Thr Arg Ala Met
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Gly Val Thr Gly Glu Pro Leu Met Ala Ala Ser Gly Glu Val Val Arg
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<210> 4

<211> 336

<212> PRT

<213> Actinoplanes sp.

<400> 4

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Gly Ala Tyr Asp Asp Tyr Arg Ala Gln Cys Pro Ala Gly Gly Asp Cys
35 40 45

Ala Gly Pro Leu Gly Gln Phe Ser Leu Asp Tyr Glu Asn Thr Leu Leu
50 55 60

Tyr Leu Ala Gly Val Leu Ala Leu Val Pro Gly Leu Leu Gly Met Phe
65 70 75 80

Trp Gly Ala Pro Leu Ile Thr Arg Glu Leu Glu Asn Gly Thr Gln Arg
85 90 95

Leu Val Trp Asn Gln Ser Val Thr Arg Arg Arg Trp Leu Leu Ile Lys
100 105 110

Leu Leu Val Val Gly Leu Ala Cys Met Val Val Ala Gly Val Pro Ser
115 120 125

Leu Leu Leu Thr Trp Ala Ala Ala Pro Val Asp Asn Val Ala Asp Asn
130 135 140

Arg Phe Ser Thr Val Met Phe Gly Ala Arg Phe Leu Pro Pro Ile Ala
145 150 155 160

Tyr Ala Ala Phe Ala Phe Val Leu Gly Thr Leu Ile Gly Leu Leu Val
165 170 175

Arg Arg Thr Val Pro Ala Met Ala Leu Thr Leu Val Ala Phe Val Ile
180 185 190

Phe Gln Phe Leu Val Pro Asn Leu Val Arg Pro His Leu Met Pro Ala
195 200 205

Lys His Leu Val Lys Pro Met Thr Val Ser Ala Ile Asn Glu Ala Lys
210 215 220

Ser Leu Gly Ser Ile Thr Gly Ala Pro Val Leu Asn Gly Leu Ser Ile
 225 230 235 240

Ser Gln Gly Trp Ile Thr Asp Val Ser Ala Leu Lys Thr Ala Asp Gly
 245 250 255

Arg Ser Leu Asp Ala Lys Thr Phe Asp Asn Cys Tyr Met Asn Ala Pro
 260 265 270

Lys Thr Gly Ala Thr Glu Gly Pro Tyr Gly Asp Val Ala Val Cys Leu
 275 280 285

Ala Lys Leu Asp Leu His Val Asp Ile Ala Tyr Gln Pro Trp Asn Arg
 290 295 300

Tyr Trp Ala Phe Gln Phe Leu Glu Ser Gly Phe Tyr Val Leu Leu Ser
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Gly Leu Leu Ile Gly Ala Ala Val Trp Arg Val Gln Arg Arg Pro Ser
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<210> 5

<211> 283

<212> PRT

<213> Actinoplanes sp.

<220>

<221> misc_feature

<222> (1)..(1)

<223> V represents a non-standard initiator codon. It is expected that the biosynthesized protein will contain a methionineresidue at this position

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Gly Leu Ala Leu Thr Gln Arg Asp Ile Thr Val His Leu Leu Asp Ala
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Asp Pro Ala Ala Ala Arg Ala Ala Ala Ala Leu Gly Ala Gly Ile Ala
 35 40 45

Gly Glu Pro Arg Thr Arg Val Asp Val Ala Val Ile Ala Val Pro Pro
 50 55 60

Ala Ala Val Ala Pro Val Leu Ala Asp Leu Gln Arg Arg Gly Thr Ala
 65 70 75 80

Arg Val His Thr Asp Ala Ala Ser Val Lys Val Leu Pro Ser Arg Gln
 85 90 95

Ile Glu Val Leu Gly Cys Asp Ala Ser Ser His Val Gly Gly His Pro
 100 105 110

Leu Ala Gly Ser Glu Arg Ser Gly Pro His Ala Ala Arg Gly Ser Leu
 115 120 125

Phe Glu Gly Arg Pro Trp Val Leu Ser Pro Gly Arg Arg Ser Ser Thr
 130 135 140
 Ala Ala Val Asp Gly Ala Leu Ala Val Val Ser Ala Cys Gly Ala Thr
 145 150 155 160
 Pro Val Leu Met Ser Ala Glu Glu His Asp Arg Ala Val Ala Leu Val
 165 170 175
 Ser His Val Pro His Leu Val Ala Gly Leu Leu Ala Ala Arg Met Leu
 180 185 190
 Asp Gly Thr Pro Ala Gln Leu Gly Leu Ala Gly Gln Gly Val Arg Asp
 195 200 205
 Thr Thr Arg Ile Ala Gly Gly Arg Ala Ala Leu Trp Thr Glu Ile Leu
 210 215 220
 Ala Ala Asn Ala Gly Ala Val Ala Asp Val Leu Asp Asp Leu Ser Ala
 225 230 235 240
 Glu Leu Ala Ala Thr Ile Ser Ala Leu Arg Glu Leu Glu Ala His Pro
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 Gly Arg Ala Glu Ala Leu Ala Ala Leu Thr Gly Met Leu Gln Arg Gly
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 Val Asp Gly Arg Asp Arg Ile Ala Ala Ser Pro
 275 280

<210> 6
 <211> 336
 <212> PRT
 <213> Actinoplanes sp.

<400> 6

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 Pro Val Asp Ser Leu Glu Met Leu Asp Ser Pro Arg Leu Ala Gly Glu
 35 40 45
 Asp Pro Arg His Thr Gln Met Leu Ala Ser Leu Asp Ala Glu Leu Pro
 50 55 60
 Pro Ile Ile Val His Arg Ala Ser Met Arg Val Ile Asp Gly Ala His
 65 70 75 80
 Arg Leu Gly Ala Ala Arg Leu Arg Gly Asp Glu Leu Ile Lys Ala Ala
 85 90 95
 Met Phe Glu Gly Ser Glu Gln Glu Ala Phe Val Leu Gly Val Lys Ala
 100 105 110
 Asn Ile Ala His Gly Leu Pro Leu Ser Thr Ala Asp Arg Thr Arg Ala
 115 120 125

Ala Glu Arg Ile Ile Glu Ser His Pro Ser Trp Ser Asp Arg Thr Ile
 130 135 140
 Ala Ala Ser Ser Gly Leu Ser Ala Arg Thr Val Gly Asn Ile Arg Arg
 145 150 155 160
 Arg Leu Glu Leu Ser Gly Asp Ile Gly Gln Gly Ser Arg Thr Arg Val
 165 170 175
 Gly Arg Asp Gly Arg Val Arg Pro Leu Asp Asn Ser Glu Gly Arg Leu
 180 185 190
 Lys Ala Val Ser Tyr Ile Gln Gln Gln Pro Asp Ala Ser Leu Arg Glu
 195 200 205
 Ile Ala Lys Asn Ala Gly Val Ser Pro Ser Thr Ala Arg Asp Val Arg
 210 215 220
 Asn Arg Leu Gln Arg Gly Glu Asp Pro Leu Pro Gly Pro Arg Arg Thr
 225 230 235 240
 Gly Gly His Arg Asp Asp Ile Ser Phe Asp Lys Glu Asn Thr Ile Arg
 245 250 255
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 260 265 270
 Pro Ser Leu Arg Phe Thr Glu Ser Gly Arg Asn Leu Leu Arg Trp Val
 275 280 285
 Leu Ala Arg Thr Val Gln Asp Asp Glu Trp Lys Asp Met Leu Asp Ala
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 Val Pro Ser His Cys Thr Tyr Val Leu Ala Asn Val Ala Arg Arg Cys
 305 310 315 320
 Ser Gln Glu Trp Leu Glu Phe Ala Glu Thr Leu Glu Lys Asn Ala Ala
 325 330 335

<210> 7
 <211> 444
 <212> PRT
 <213> Actinoplanes sp.

<400> 7

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 35 40 45
 Pro Gly Arg Pro Phe Asp Gly Phe Phe Asp Val Glu Gln Ile Phe Arg
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 Gly Ile Arg Gly Tyr Leu Glu His Leu Ala Gly Gln Gly Arg Ser Pro
 65 70 75 80

Ala Glu Ile Arg Asp Ala Val Phe Gln Tyr Gly Pro Ala Ala Gly Arg
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 Ile Arg Glu Val Ile Ala Gln Trp Leu Arg Arg Asp Glu Gly Ile Asp
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 Val Ala Pro Glu Ser Ile Val Val Thr Val Gly Ala Gln Glu Ala Met
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 Val Ala Ser Pro Cys Tyr Val Gly Ile Thr Gly Ala Ala Arg Leu Leu
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 165 170 175
 Glu Asp Leu Ala Arg Ala Val His Ala Glu Leu Ser Arg Gly Arg Arg
 180 185 190
 Pro Arg Ala Phe Tyr Val Val Pro Asp His Thr Asn Pro Ser Gly Ala
 195 200 205
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 225 230 235 240
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 245 250 255
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 260 265 270
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 275 280 285
 Gly Leu Leu Ala Asp Glu Leu Ala Lys Val Lys Ser Met Val Thr Val
 290 295 300
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 325 330 335
 Gly Ala Ala Met Arg Arg Thr Leu Asp Arg Leu Glu Glu His Leu Pro
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 Ala Ser Phe Arg Ala Arg Thr Gly Val Arg Trp Asn Arg Pro Ser Gly
 355 360 365
 Gly Phe Phe Leu Ala Val Asn Val Pro Phe Thr Ala Asp Asn Ala Ala
 370 375 380
 Leu Ser Arg Ser Ala Glu Asp His Gly Val Ile Trp Thr Pro Met Ser
 385 390 395 400
 Tyr Phe Tyr Pro Ala Gly Gly Gly Glu Gln Gly Ile Arg Leu Ser Ile

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405                               410                               415
Ser Tyr Leu Thr Pro Glu Glu Ile Asp Glu Gly Val Lys Arg Leu Ala
      420                               425                               430

Gly Phe Ile Thr Thr Glu Ile Ala Ala Leu Arg Pro
      435                               440

<210> 8
<211> 356
<212> PRT
<213> Actinoplanes sp.

<220>
<221> misc_feature
<222> (1)..(1)
<223> V represents a non-standard initiator codon. It is expected that
      the biosynthesized protein will have a formylmethionine residue
      at this position

<400> 8

Val Thr Ala Thr Ala Leu Leu Pro Leu Thr Leu Ala Asp Tyr Glu Gln
1      5      10      15
Leu Ala Gln Ala Arg Met Glu Pro Pro Val Trp Asp Phe Ile Ala Gly
      20      25      30
Gly Ala Gly Glu Glu Leu Thr Leu Ala Ala Asn Thr Ala Ala Phe Ala
      35      40      45
Pro Pro Arg Leu Arg Pro Arg Val Leu Thr Gly Ala Gly Ala Pro Asp
      50      55      60
Thr Gly Thr Thr Ile Leu Gly Arg Arg Trp Ala Ala Pro Ile Gly Val
65      70      75      80
Ala Pro Leu Gly Tyr His Thr Leu Val Asp Pro Ala Gly Glu Val Ala
      85      90      95
Thr Ala Ala Ala Ala Gly Ala Ala Gly Leu Pro Leu Val Val Ser Thr
      100     105     110
Phe Ser Gly Arg Thr Val Glu Asp Ile Ala Ala Ala Thr Thr Ala Pro
      115     120     125
Arg Trp Leu Gln Val Tyr Cys Phe Arg Asp Arg Ala Val Thr Ala Ala
      130     135     140
Leu Val Thr Arg Ala Val Arg Ala Gly Phe Glu Ala Leu Val Leu Thr
145     150     155     160
Val Asp Ala Pro Arg Leu Gly Arg Arg Leu Arg Asp Ile Arg Asn Asp
      165     170     175
Phe Arg Leu Pro Pro Gly Val Ala Pro Ala Asn Leu Thr Gly Asp Gly
      180     185     190
Phe Ala Ser Pro Ser Gly His Ala Leu Gly Ala Phe Asp Ala Ala Met
      195     200     205

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Gly Phe Ile Thr Thr Glu Ile Ala Ala Leu Arg Pro
435 440

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<210> 8
<211> 356
<212> PRT
<213> Actinoplanes sp.

<220>
<221> misc_feature
<222> (1)..(1)
<223> V represents a non-standard initiator codon. It is expected that
      the biosynthesized protein will have a formylmethionine residue
      at this position

```

<400> 8

Val 1	Thr	Ala	Thr	Ala 5	Leu	Leu	Pro	Leu	Thr 10	Leu	Ala	Asp	Tyr	Glu 15	Gln
Leu	Ala	Gln	Ala 20	Arg	Met	Glu	Pro	Pro 25	Val	Trp	Asp	Phe	Ile 30	Ala	Gly
Gly	Ala 35	Gly	Glu	Glu	Leu	Thr	Leu 40	Ala	Ala	Asn	Thr	Ala 45	Ala	Phe	Ala
Pro 50	Pro	Arg	Leu	Arg	Pro	Arg 55	Val	Leu	Thr	Gly	Ala 60	Gly	Ala	Pro	Asp
Thr 65	Gly	Thr	Thr	Ile 70	Leu	Gly	Arg	Arg	Trp	Ala 75	Ala	Pro	Ile	Gly	Val 80
Ala	Pro	Leu	Gly	Tyr 85	His	Thr	Leu	Val	Asp 90	Pro	Ala	Gly	Glu	Val 95	Ala
Thr	Ala	Ala 100	Ala	Gly	Ala	Ala	Gly 105	Leu	Pro	Leu	Val	Val 110	Ser	Thr	
Phe	Ser 115	Gly	Arg	Thr	Val	Glu	Asp 120	Ile	Ala	Ala	Ala	Thr 125	Thr	Ala	Pro
Arg 130	Trp	Leu	Gln	Val	Tyr	Cys 135	Phe	Arg	Asp	Arg	Ala 140	Val	Thr	Ala	Ala
Leu 145	Val	Thr	Arg	Ala	Val 150	Arg	Ala	Gly	Phe	Glu 155	Ala	Leu	Val	Leu	Thr 160
Val	Asp	Ala	Pro	Arg 165	Leu	Gly	Arg	Arg	Leu 170	Arg	Asp	Ile	Arg	Asn 175	Asp
Phe	Arg	Leu	Pro 180	Pro	Gly	Val	Ala	Pro 185	Ala	Asn	Leu	Thr	Gly 190	Asp	Gly
Phe	Ala 195	Ser	Pro	Ser	Gly	His	Ala 200	Leu	Gly	Ala	Phe	Asp 205	Ala	Ala	Met

Asp Trp Thr Val Val Ala Trp Leu Arg Glu Leu Ser Gly Leu Pro Val
 210 215 220
 Leu Leu Lys Gly Val Leu Thr Ala Asp Gly Ala Arg Arg Ala Leu Asp
 225 230 235 240
 Ala Gly Ala Asp Gly Ile Val Val Ser Asn His Gly Gly Arg Gln Leu
 245 250 255
 Asp Gly Val Pro Ala Thr Leu Asp Val Leu Pro Glu Val Val Ala Ala
 260 265 270
 Val Ala Gly Arg Cys Pro Val Leu Leu Asp Gly Gly Val Arg Arg Gly
 275 280 285
 Arg Asp Val Leu Leu Ser Leu Ala Leu Gly Ala Asp Ala Val Leu Val
 290 295 300
 Gly Arg Pro Val Leu Tyr Gly Leu Ala Val Gly Gly Thr Ala Gly Val
 305 310 315 320
 Arg His Val Leu Asp Ile Leu Ala Gly Glu Leu Thr Asp Asp Met Ala
 325 330 335
 Leu Ala Gly Val Ala Ser Pro Ala Asp Ala Gly Ala Asp Leu Ala Gly
 340 345 350
 Pro Val Ala Pro
 355

<210> 9
 <211> 640
 <212> PRT
 <213> Actinoplanes sp.

<220>
 <221> misc_feature
 <222> (1)..(1)
 <223> V represents a non-standard initiator codon. It is expected that
 the biosynthesized protein will have a formylmethionine at this
 position

<400> 9

Val Ala Thr Ile Asp Gly Pro Asp Leu Gly Val Ile Gly Leu Arg Val
 1 5 10 15
 Asp Gly Leu Ile Pro Met Gln Lys Val Arg Pro Gly Thr Val Arg Arg
 20 25 30
 Ile Leu Pro Tyr Ala Lys Lys His Arg Trp Ser Leu Ala Val Ala Leu
 35 40 45
 Leu Met Thr Val Val Asp Ala Ala Leu Thr Val Ala Asn Pro Leu Leu
 50 55 60
 Leu Lys Gln Ile Ile Asp Arg Gly Ile Val Ala Gly Arg Leu Asp Val
 65 70 75 80

Val Val Gly Leu Ser Leu Val Val Ala Gly Leu Ala Leu Val Asn Val
 85 90 95
 Ala Ala Ile His Val Gln Thr Leu Ala Ser Gly Arg Val Gly Gln Gly
 100 105 110
 Leu Ile Tyr Asp Leu Arg Thr Lys Val Phe Ala His Val Met Arg Gln
 115 120 125
 Pro Leu Ala Phe Phe Thr Arg Ala Gln Thr Gly Ser Leu Val Ser Arg
 130 135 140
 Leu Asn Thr Asp Val Val Gly Ala Glu Gln Ala Met Thr Ser Met Ile
 145 150 155 160
 Thr Gln Thr Val Ser Thr Val Leu Thr Val Val Leu Val Ile Gly Ala
 165 170 175
 Met Phe Tyr Leu Ser Trp Ala Ile Ala Leu Val Ala Leu Val Leu Ile
 180 185 190
 Pro Leu Phe Phe Leu Pro Gly Lys Leu Ile Ala Gly Arg Leu Glu Arg
 195 200 205
 Leu Ala Arg Gly Gly Met Gln Val Asp Ala Glu Leu Gly Ser Met Met
 210 215 220
 Asn Glu Arg Phe Asn Val Ser Gly Ala Met Leu Val Lys Leu Tyr Gly
 225 230 235 240
 Arg Pro Glu Ser Glu Glu Thr Ala Phe Ala Gly Arg Ala Ala Arg Val
 245 250 255
 Arg Asp Ile Ala Ile Ser Met Gly Val His Ala Arg Leu Leu Phe Ile
 260 265 270
 Ile Ala Thr Leu Leu Thr Thr Val Thr Thr Ala Met Val Tyr Gly Phe
 275 280 285
 Gly Gly Ala Leu Val Ile Asp Gly Thr Leu Gly Ile Gly Thr Leu Val
 290 295 300
 Ala Met Val Ala Leu Leu Ala Gln Leu Tyr Gly Pro Val Asn Gln Leu
 305 310 315 320
 Thr Asn Ile Gln Val Asp Val Val Thr Ala Leu Val Ser Phe Asp Arg
 325 330 335
 Val Phe Glu Val Leu Asp Leu Asp Pro Leu Val Lys Glu Arg Pro Gly
 340 345 350
 Ala Arg Ala Leu Pro Ala Ala Glu Pro Gly Arg Ser Ala Ala Pro Asp
 355 360 365
 Ile Glu Phe Asp Asn Val Val Phe Arg Tyr Pro Gly Ala Asp Glu Val
 370 375 380
 Ser Leu Ala Ser Leu Glu Thr Val Ala Gln Arg Ser Ser Asp Gly Thr
 385 390 395 400
 Ala Glu Arg Pro Val Leu Asn Gly Ile Ser Phe Leu Ala Pro Ala Gly

Ala Tyr Arg Arg Ser Gly Ala Gly Glu Pro Val Leu Met Ile Met Gly
 20 25 30
 Ser Gly Ser Ala Gly Gln Thr Trp Thr Val His Gln Thr Pro Ala Leu
 35 40 45
 His Glu Ala Gly Tyr Ser Thr Val Val Phe Asp Ser Arg Gly Ile Pro
 50 55 60
 Pro Ser Asp Val Pro Ala Gly Lys Tyr Ser Leu Ala Asp Met Thr Ala
 65 70 75 80
 Asp Thr Arg Gly Leu Ile Glu Ala Leu Asp Leu Ala Pro Cys Arg Ile
 85 90 95
 Val Gly Thr Ser Leu Gly Ala Met Ile Ala Gln Glu Leu Ala Val Asp
 100 105 110
 His Pro Glu Leu Val Arg Cys Ala Val Leu Ile Ala Thr Leu Ala Arg
 115 120 125
 Pro Asp Ala Ala Arg Ala Ala Gln Asn Gln Ala Asp Ile Asp Leu Leu
 130 135 140
 Glu Ser Gly Val Thr Leu Pro Ala Ala Tyr Glu Ala Ala Thr Ala Val
 145 150 155 160
 Phe Lys Met Phe Ser Pro Ala Thr Leu Asn Asp Asp Val Ala Val Arg
 165 170 175
 Glu Trp Leu Asp Ile Phe Glu Leu Ser Gly Thr Gly Val Ser Ala Gly
 180 185 190
 Gly Gln Ala Trp Ala Glu Leu Thr Gly Asp Arg Arg Ala Ala Leu Arg
 195 200 205
 Ser Val Thr Ala Pro Cys Arg Val Ile Ser Phe Ala Asp Asp Leu Ile
 210 215 220
 Thr Pro Pro His Leu Ala Ala Glu Val Ala Glu Ala Ile Pro Asp Cys
 225 230 235 240
 Asp Leu Val Glu Ile Ser Arg Cys Gly His Leu Gly Tyr Leu Glu Arg
 245 250 255
 Pro Asp Ala Val Asn Ala Ala Ile Leu Glu Phe Leu Asp Ser His
 260 265 270

<210> 11
 <211> 529
 <212> PRT
 <213> Actinoplanes sp.

<400> 11

Met Gly Asn Ala Asp Gln Pro Arg Tyr Leu Arg Ser Asn Val Ile Ala
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 Glu Pro Leu Val Asp Arg Phe Tyr Ala Trp Leu His Thr Val Ala Pro
 20 25 30

Val Pro Ala Ser Met Asn Leu Ala Phe Leu Gln Val Pro Leu Leu Glu
 35 40 45
 Ser Tyr Leu Gln Ser Pro Pro Val His Val Ala Ala Ser Thr Asn Pro
 50 55 60
 Lys Met Arg Gly Gly Tyr Phe Val Ala Val Glu Glu Ser Arg Ser Asp
 65 70 75 80
 Glu Val Ala Glu Leu Leu Lys Thr Ile Lys Asn Glu Arg Ala Asp Met
 85 90 95
 Leu Gly Phe Ala Ala Ala Val Ala Glu Ala Glu Asp Leu Ile Arg Glu
 100 105 110
 Asn Ala Val Gly Tyr Asp Leu Thr Pro Leu Tyr Pro Arg Leu Pro Ala
 115 120 125
 Ala Leu Asn Gly Leu Val Glu Ile Ala Tyr Asp Thr Ser Asn Gln Pro
 130 135 140
 Ser Leu His Phe Leu Glu Pro Leu Leu Tyr Arg Ser Pro Ala Tyr Asp
 145 150 155 160
 Glu Arg Arg Gln Ser Val Gln Leu Ser Leu Asp Asp Gly Val Glu Arg
 165 170 175
 Pro Phe Ile Leu Ser Thr Pro Arg Leu Pro Arg Ala Gly Val Leu Asp
 180 185 190
 Leu Pro Leu Pro Leu Arg His Pro Gly Leu Thr Glu Leu Phe Asp Ala
 195 200 205
 Arg Val Arg Pro Thr Ser Leu Asn Arg Leu Arg Glu Ala Leu Glu Leu
 210 215 220
 Asp Asp Ala Gly Ala Ala Ala Leu Asp Ala Leu Leu Thr Asp Glu Pro
 225 230 235 240
 Ser Leu Ser Pro Asp Arg His Ile Glu Ser Gly Gly Arg Val Arg Tyr
 245 250 255
 Tyr Gly His Ala Cys Val Val Met Gln Thr Glu Gln Ala Ala Val Val
 260 265 270
 Thr Asp Pro Phe Ile Ser Thr Asp Asn Arg His Gly Asp Arg Tyr Thr
 275 280 285
 Leu Asp Asp Leu Pro Asp His Ile Asp Leu Val Leu Ile Thr His Gly
 290 295 300
 His Gln Asp His Ile Val Leu Glu Thr Leu Leu Gln Leu Arg Gly Arg
 305 310 315 320
 Ile Gly Thr Val Val Val Pro Arg Thr Ser Arg Gly Asn Leu Pro Asp
 325 330 335
 Pro Ser Ile Ala Leu Tyr Leu Arg Arg Ile Gly Phe Thr Val Val Glu
 340 345 350

Val Glu Glu Phe Asp Glu Val Pro Phe Pro Gly Gly Thr Val Thr Ala
 355 360 365
 Thr Pro Phe Leu Gly Glu His Ala Asp Leu Asp Ile Arg Gly Lys Ser
 370 375 380
 Thr Tyr Phe Val Arg Met Ala Gly Arg Thr Ile Phe Ile Gly Ala Asp
 385 390 395 400
 Ser Ser Gly Ile Asp Pro Val Leu Tyr Arg Tyr Ile Arg Asp His Val
 405 410 415
 Gly Gln Val Asp Met Ala Phe Leu Gly Met Glu Cys Asp Gly Ala Pro
 420 425 430
 Leu Asn Trp Leu Tyr Lys Gly Leu Leu Thr Lys Pro Val Asn Lys Lys
 435 440 445
 Met Ser Ala Ser Arg Arg Leu Ser Gly Ser Asn Ala Glu Gln Ala Gly
 450 455 460
 Ala Ile Met Thr Glu Leu Gly Ala Thr Ala Gly Tyr Ile Tyr Ala Met
 465 470 475 480
 Gly Glu Glu Ser Trp Gln Gly His Val Met Ala Thr Thr Tyr Asn Glu
 485 490 495
 Asp Thr Tyr Gln Leu Lys Gln Ile Asp Glu Phe Leu Ala Trp Cys Ala
 500 505 510
 Asp Arg Gly Phe Thr Ala Glu His Leu Phe Asn Lys Arg Glu Trp Arg
 515 520 525

Trp

<210> 12
 <211> 90
 <212> PRT
 <213> Actinoplanes sp.

<400> 12

Met Ser Glu Thr Asp Leu Ser Ala Ala Arg His Thr Pro Glu Gln Ile
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 Arg Ser Trp Leu Ile Asp Arg Ile Ala Tyr Tyr Val Met Leu Pro Thr
 20 25 30
 Gln Glu Ile Glu Pro Asp Val Ser Leu Ala Glu Tyr Gly Leu Asp Ser
 35 40 45
 Val Tyr Ala Phe Ala Leu Cys Gly Glu Ile Glu Asp Thr Leu Gly Ile
 50 55 60
 Pro Ile Glu Pro Thr Leu Leu Trp Asp Val Asp Thr Val Ala Thr Leu
 65 70 75 80
 Thr Ala His Leu Ala Asp Arg Val Asn Arg
 85 90

<210> 13
 <211> 1051
 <212> PRT
 <213> Actinoplanes sp.

 <220>
 <221> misc_feature
 <222> (1)..(1)
 <223> V represents a non-standard codon. It is expected that the biosynthesized protein will have a formylmethionine residue at this position

<400> 13

Val	Pro	Thr	Pro	Asp	Leu	Arg	Pro	Leu	Thr	Pro	Ala	Gln	Leu	Ala	Val	1	5	10	15
Trp	His	Ala	Gln	Gln	Leu	Ala	Pro	His	Ser	Pro	Val	Tyr	Gln	Val	Gly	20	25	30	
Glu	Phe	Val	Glu	Ile	Asp	Gly	Glu	Cys	Asp	Pro	Asp	Leu	Leu	Val	Ala	35	40	45	
Ala	Leu	Arg	Gln	Val	Met	Gly	Glu	Ala	Glu	Ser	Ala	Arg	Leu	Arg	Phe	50	55	60	
Arg	Val	Ile	Asp	Gly	Thr	Pro	Trp	Gln	Tyr	Val	Ala	Glu	Asp	Gly	Asp	65	70	75	80
Asp	Pro	Ile	Gln	Val	Val	Asp	Leu	Gly	Ala	Ala	Ala	Asp	Pro	Arg	Ala	85	90	95	
Ala	Ala	Leu	Gly	Arg	Met	Ala	Ala	Asp	Leu	Asp	Arg	Pro	Gly	Asp	Leu	100	105	110	
Arg	Asp	Gly	Pro	Leu	Val	Glu	His	His	Val	Tyr	Leu	Leu	Gly	Glu	Gly	115	120	125	
Arg	Val	Ile	Trp	Tyr	His	Arg	Ala	His	His	Ile	Val	Cys	Asp	Gly	Gly	130	135	140	
Ser	Leu	Gly	Ile	Val	Ala	Ser	Arg	Val	Ala	Gly	Val	Tyr	Ser	Ala	Leu	145	150	155	160
Ala	Ala	Gly	Gly	Asp	Val	Arg	Pro	Gly	Ala	Leu	Pro	Pro	Leu	Ser	Val	165	170	175	
Leu	Leu	Ser	Ala	Ala	Asp	Ala	Tyr	Glu	Arg	Ser	Gly	Asp	Arg	Asp	Arg	180	185	190	
Asp	Arg	Glu	His	Trp	Arg	Ser	Ala	Leu	Ala	Gly	Leu	Pro	Ala	Glu	Leu	195	200	205	
Leu	Ala	Gly	Ala	Gly	Arg	Pro	Arg	Pro	Leu	Pro	Gly	Pro	Pro	Val	Arg	210	215	220	
His	Glu	His	Asp	Leu	Ser	Ala	Ala	Glu	Ala	Gly	Arg	Leu	Arg	Ala	Gly	225	230	235	240
Ala	Arg	Arg	Leu	Arg	Thr	Ser	Val	Ala	Gln	Ala	Gly	Ile	Ala	Ala	Ala				

245										250					255				
Ala	Leu	Tyr	Gln	His	Arg	Leu	Thr	Gly	Ala	Arg	Asp	Val	Leu	Val	Ala				
			260					265					270						
Val	Pro	Val	Ala	Gly	Arg	Thr	Thr	Arg	Pro	Glu	Phe	Asp	Val	Pro	Gly				
		275					280					285							
Met	Thr	Ser	Asn	Val	Val	Pro	Val	Arg	Leu	Ala	Val	Thr	Pro	Ala	Thr				
	290					295						300							
Thr	Val	Gly	Glu	Leu	Leu	Arg	Asp	Val	Ala	Arg	Gly	Val	Arg	Asp	Gly				
305				310					315						320				
Leu	Arg	His	Gln	Arg	Tyr	Pro	Tyr	Pro	Asn	Ile	Val	Asp	Asp	Leu	Gly				
			325						330					335					
Leu	Ala	Asp	Arg	Ala	Ala	Leu	Arg	Pro	Val	Thr	Val	Asn	Ala	Leu	Ala				
			340					345					350						
Leu	Gly	Arg	Pro	Leu	Arg	Phe	Gly	Ser	Ala	Val	Gly	Val	Arg	Ser	Gly				
	355						360					365							
Leu	Ser	Ala	Gly	Pro	Val	Asp	Asp	Val	Thr	Ile	Gly	Leu	Tyr	Glu	Lys				
	370					375					380								
Val	Ser	Gly	Gly	Gly	Met	Gln	Thr	Ile	Ala	Glu	Leu	Asn	Pro	Gly	Arg				
385					390					395					400				
Thr	Asp	Arg	Pro	Asp	Ala	Ala	Glu	Val	Ser	Arg	Trp	Phe	Arg	Thr	Leu				
				405					410					415					
Leu	Arg	Gly	Leu	Ala	Glu	Ser	Asp	Ala	Gly	Asp	Pro	Val	Ala	Arg	Ile				
			420					425					430						
Asp	Ile	Val	Asp	Glu	Pro	Glu	Arg	Arg	Arg	Leu	Leu	Asp	Glu	Trp	Asn				
	435						440					445							
Ala	Thr	Ala	Ala	Pro	Ser	Ser	Asp	Thr	Val	Leu	Ala	Arg	Phe	Glu	Glu				
	450					455					460								
Gln	Ala	Ala	Arg	Thr	Pro	Glu	Ala	Pro	Ala	Val	Val	Cys	Gly	Asp	Val				
465					470					475					480				
Thr	Val	Thr	Tyr	Ala	Glu	Leu	Glu	Ala	Gly	Ala	Asn	Arg	Leu	Ala	Arg				
				485					490					495					
Val	Leu	Arg	Ala	Arg	Gly	Ala	Gly	Pro	Glu	Ser	Val	Val	Ala	Leu	Cys				
			500					505					510						
Leu	Pro	Arg	Gly	Pro	Glu	Val	Val	Thr	Gly	Ile	Leu	Ala	Ala	Trp	Lys				
		515					520					525							
Ala	Gly	Ala	Ala	Tyr	Leu	Pro	Val	Asp	Thr	Glu	Leu	Pro	Ala	Glu	Arg				
	530					535					540								
Val	Ala	Tyr	Leu	Leu	Gly	Asp	Ser	Ala	Ala	Ala	Val	Arg	Leu	Gly	Thr				
545					550					555					560				
Ala	Glu	Thr	Leu	Ala	Ala	Leu	Pro	Asp	Gly	Pro	Ala	Ala	Asp	Val	Asp				
			565						570					575					

Val	His	Ala	Pro	Glu	Ile	Ala	Arg	Glu	Ser	Pro	Ser	Pro	Leu	Arg	Leu	580	585	590
Glu	Pro	Leu	Pro	Asp	Gln	Leu	Ala	Tyr	Val	Ile	Tyr	Thr	Ser	Gly	Ser	595	600	605
Thr	Gly	Leu	Ser	Lys	Gly	Val	Gly	Val	Ser	His	Gly	Gly	Leu	Ala	Asn	610	615	620
Tyr	Val	Gly	Trp	Ala	Ser	Val	Leu	Tyr	Gly	Gly	Leu	Ser	Ala	Pro	Leu	625	630	635
His	Ser	Ser	Leu	Ala	Phe	Asp	Leu	Thr	Val	Thr	Ser	Val	Phe	Val	Pro	645	650	655
Leu	Val	Cys	Gly	Gly	Ser	Val	Val	Val	Ser	Ala	Ala	Gly	Gly	Gly	Arg	660	665	670
Gly	Leu	Ala	Ser	Leu	Leu	Ala	Ala	Gly	Asp	Gly	Phe	Ser	Leu	Val	Lys	675	680	685
Val	Val	Pro	Gly	His	Leu	Arg	Leu	Leu	Ala	Glu	Leu	Val	Pro	Ala	Gly	690	695	700
Glu	Met	Ala	Ala	Val	Gly	Ser	Leu	Val	Ala	Gly	Gly	Glu	Val	Leu	Ala	705	710	715
Gly	Gly	Asp	Val	Arg	Glu	Trp	Leu	Ser	Arg	Val	Pro	Gly	Ser	Val	Val	725	730	735
Val	Asn	Glu	Tyr	Gly	Pro	Thr	Glu	Thr	Val	Val	Gly	Cys	Ser	Val	Phe	740	745	750
Ser	Val	Ala	Ala	Gly	Asp	Val	Val	Gly	Asp	Val	Val	Pro	Val	Gly	Arg	755	760	765
Pro	Val	Ala	Asn	Thr	Arg	Leu	Phe	Val	Leu	Asp	Glu	Gly	Leu	Arg	Pro	770	775	780
Val	Pro	Ala	Gly	Val	Ala	Gly	Glu	Leu	Tyr	Val	Ala	Gly	Ser	Gln	Val	785	790	795
Ala	Arg	Gly	Tyr	Val	Gly	Arg	Ser	Gly	Leu	Thr	Ala	Ser	Arg	Phe	Val	805	810	815
Ala	Cys	Pro	Phe	Gly	Val	Gly	Glu	Arg	Met	Tyr	Arg	Thr	Gly	Asp	Val	820	825	830
Val	Arg	Leu	Ala	Gly	Gly	Asp	Leu	Val	Phe	Val	Gly	Arg	Val	Asp	Glu	835	840	845
Gln	Val	Lys	Ile	Arg	Gly	Tyr	Arg	Val	Glu	Pro	Asp	Glu	Val	Arg	Leu	850	855	860
Val	Val	Ala	Gly	His	Pro	Arg	Val	Ala	Gly	Ala	Ala	Val	Val	Ala	Arg	865	870	875
Pro	Asp	Ala	Val	Gly	Glu	Arg	Gln	Leu	Val	Ala	Tyr	Val	Val	Ala	Ala	885	890	895

Gly Glu Pro Ala Gly Leu Ala Glu Ser Val Arg Ala His Val Ala Glu
 900 905 910
 Arg Leu Pro Glu Tyr Met Val Pro Ala Ala Val Val Thr Leu Asp Glu
 915 920 925
 Ile Pro Leu Thr Val Asn Gly Lys Val Asp Arg Ala Ala Leu Pro Glu
 930 935 940
 Pro Gly Pro Val Ala Thr Gly Asn Ala Asp Arg Glu Pro Thr Thr Glu
 945 950 955 960
 Arg Glu Ser Leu Leu Cys Gly Ala Phe Ala Asp Val Leu Gly Ile Glu
 965 970 975
 Arg Val Gly Val Asp Asp Asp Phe Phe Ser Leu Gly Gly His Ser Leu
 980 985 990
 Leu Ala Thr Ser Leu Val Ser Arg Val Arg Leu Val Leu Gly Glu Glu
 995 1000 1005
 Leu Pro Ile Glu Glu Leu Phe Ala Thr Pro Thr Pro Ala Glu Leu
 1010 1015 1020
 Ala Ala Trp Leu Gln Arg Asn Ala Asp Arg Pro Gln Pro Ala Arg
 1025 1030 1035
 Pro Ala Leu Arg Pro Met His Glu Arg Glu Thr Thr Ala
 1040 1045 1050
 <210> 14
 <211> 6893
 <212> PRT
 <213> Actinoplanes sp.
 <400> 14
 Met Thr Pro Met Ser Tyr Ala Gln Arg Arg Leu Trp Phe Gln Leu Arg
 1 5 10 15
 Val Glu Gly Pro Asp Ala Thr Tyr Asn Ser Pro Ala Val Leu Arg Leu
 20 25 30
 Thr Gly Glu Leu Asp Thr Ala Ala Leu Glu His Ala Leu Arg Asp Val
 35 40 45
 Leu Glu Arg His Glu Val Leu Arg Thr Val Tyr Pro Asp Val Gly Gly 50
 55 60
 Glu Pro Arg Gln Arg Val Val Arg Pro Asp Asp Met Val Trp Glu Leu
 65 70 75 80
 Pro Thr Thr Arg Val Ser Gly Ala Gly Ala Gly Asp Asp Arg Leu Val
 85 90 95
 Thr Leu Asp Glu Leu Pro Trp Asp Arg Pro Val Leu Asp Leu Pro Ser
 100 105 110
 Pro Ala Pro Ala Gly Arg Glu Pro Asp Gly Glu Ile Thr Val Asp Glu
 115 120 125

Leu Pro Gly Ala Ile Ala Arg Val Ala Ala His Pro Phe Asp Leu Ser
 130 135 140
 Ile Glu Ile Pro Val Arg Ala Arg Leu Phe Ala Leu Gly Pro Arg His
 145 150 155 160
 His Val Leu Val Val Val Leu His His Ile Ala Thr Asp Gly Ser Ser
 165 170 175
 Gly Gly Pro Phe Ala Arg Asp Leu Ala Ala Ala Tyr Arg Ala Arg Arg
 180 185 190
 Thr Gly Thr Ala Pro Gln Trp Ala Pro Leu Pro Val Gln Tyr Ala Asp
 195 200 205
 Tyr Ala Ala Trp Gln Gln Glu Leu Leu Gly Ala Glu Asp Asp Pro Asp
 210 215 220
 Ser Val Ile Ser Arg Gln Leu Ala His Trp Gln Glu Arg Leu Ala Gly
 225 230 235 240
 Met Pro Val Glu Leu Asp Leu Pro Ala Asp Arg Pro Arg Pro Ala Glu
 245 250 255
 Pro Gly His Gly Gly His Thr Lys Ala Leu Ser Leu Pro Pro Ala Val
 260 265 270
 His Arg Gly Leu Ala Thr Leu Ala Arg Arg Arg Arg Ala Thr Leu Gln
 275 280 285
 Met Val Val Gln Thr Gly Val Ala Ile Leu Leu Ser Lys Leu Gly Ala
 290 295 300
 Gly Arg Asp Val Pro Leu Gly Ile Pro Val Ala Gly Arg Thr Asp Ala
 305 310 315 320
 Ala Leu Asp Asp Leu Ile Gly Phe Phe Val Asn Thr Leu Val Val Arg
 325 330 335
 Ala Asp Leu Ser Gly Asp Pro Thr Val Ala Asp Ala Leu Gly Arg Val
 340 345 350
 Arg Gly Gly Ala Val Ala Ala Leu Ala Asp Gln Asp Val Pro Phe Asp
 355 360 365
 Lys Leu Val Glu Arg Leu Ala Pro Ala Arg Val Leu Gly Arg His Pro
 370 375 380
 Leu Phe Gln Val Met Val Ala Pro Leu Asp Asp Gly Thr Pro Ile Asp
 385 390 395 400
 Leu Asp Gly Val Arg Gly Glu Pro Leu Thr Ile Gly Arg Ser Gly Ala
 405 410 415
 Lys Phe Asp Val Glu Val Met Thr Gly Glu Val Arg Ala Ala Asp Gly
 420 425 430
 Ala Pro Ala Gly Ile Arg Gly Ile Leu Thr Leu Ser Ala Asp Leu Phe
 435 440 445
 Asp Glu Ala Thr Ala Gly Arg Met Ala Ala Gly Leu Val Arg Val Leu

450	455	460
Thr Ala Met Ala Glu Ala Pro Glu Arg Arg Leu Ser Gly Ile Glu Val 465 470 475 480		
Leu Ser Pro Gly Glu Arg Ser Arg Leu Leu Val Glu Trp Asn Asp Thr 485 490 495		
Ala Arg Pro Val Val Glu Ser Ser Val Pro Ala Leu Phe Ala Lys Arg 500 505 510		
Val Ala Ala Thr Pro Asp Ala Thr Ala Val Val Gly Glu Gly Val Ser 515 520 525		
Trp Ser Tyr Arg Glu Leu Asp Arg Arg Ser Asp Val Leu Ala Arg Arg 530 535 540		
Leu Val Ala Ala Gly Val Gly Val Glu Ser Pro Val Val Val Ala Leu 545 550 555 560		
Glu Arg Ser Pro Glu Val Leu Ser Ala Phe Leu Ala Val Ala Lys Ala 565 570 575		
Gly Gly Val Phe Val Pro Val Asp Leu Ser Trp Pro Gln Ala Arg Val 580 585 590		
Asp Ala Val Val Ala Asp Cys Ala Ala Arg Val Ala Val Ala Asp Arg 595 600 605		
Pro Met Ser Gly Leu Thr Val Val Ser Ala Gly Leu Gly Gly Asp Ser 610 615 620		
Ala Val Val Ser Ala Asp Leu Thr Ala Asp Arg Ala Val Val Leu Pro 625 630 635 640		
Ser Arg Pro Val Pro Gly Ala Ala Val Tyr Arg Met Tyr Thr Ser Gly 645 650 655		
Ser Thr Gly Arg Pro Lys Gly Val Val Thr Thr His Gln Asn Leu Val 660 665 670		
Asp Leu Ala Thr Asp Thr Cys Trp Gly Pro Thr Pro Arg Val Leu Phe 675 680 685		
His Ala Pro His Ala Phe Asp Ala Ser Ser Tyr Glu Ile Trp Val Pro 690 695 700		
Leu Leu Asn Gly Gly Thr Val Val Val Ala Pro Gln Arg Ser Ile Asp 705 710 715 720		
Ala Thr Val Leu Lys Asp Leu Ile Arg Ala His Asp Leu Thr His Val 725 730 735		
His Val Thr Ala Gly Leu Leu Arg Val Leu Asp Pro Ser Cys Phe Ala 740 745 750		
Gly Leu Thr Glu Val Leu Thr Gly Gly Asp Ala Val Ser Ala Glu Ala 755 760 765		
Val Arg Arg Val Lys Asp Ala Asn Pro Gly Leu Arg Val Arg Gln Leu 770 775 780		

Tyr Gly Pro Thr Glu Val Thr Leu Cys Ala Thr Gln His Leu Leu Asp
 785 790 795 800
 Asp Gly Val Pro Ile Gly Arg Pro Leu Asp Asn Thr Arg Val Tyr Val
 805 810 815
 Leu Asp Asp Leu Leu Gln Pro Val Pro Val Gly Val Thr Gly Glu Leu
 820 825 830
 Tyr Val Ala Gly Ala Gly Val Ala Arg Gly Tyr Ala Gly Met Pro Gly
 835 840 845
 Leu Thr Ala Glu Arg Phe Val Ala Asp Pro Phe Asn Thr Gly Gly Arg
 850 855 860
 Leu Tyr Arg Thr Gly Asp Leu Val Arg Trp Thr Asp Asp Gly Val Leu
 865 870 875 880
 His Phe Ala Gly Arg Ala Asp Asp Gln Val Lys Ile Arg Gly Tyr Arg
 885 890 895
 Val Glu Pro Gly Glu Val Glu Ala Val Leu Ala Gln His Pro Asp Val
 900 905 910
 Ser Gln Val Ala Val Val Val Arg Glu Asp Thr Pro Gly Asp Lys Arg
 915 920 925
 Leu Val Ala Tyr Val Val Gly Gly Asp Ile Glu Ala Tyr Gly Gln Glu
 930 935 940
 Arg Leu Pro Gly Tyr Met Val Pro Ser Ala Phe Val His Leu Asp Ala
 945 950 955 960
 Leu Pro Leu Thr Ser Asn Gln Lys Val Asp Arg Ala Ala Leu Pro Ala
 965 970 975
 Pro Ser Met Glu Ser Gly Ala Gly Arg Ala Pro Ala Asp Ala Arg Glu
 980 985 990
 Glu Leu Val Cys Ala Ala Phe Ala Glu Val Leu Gly Leu Asp Arg Val
 995 1000 1005
 Gly Val Asp Asp Asp Phe Phe Ala Leu Gly Gly His Ser Leu Leu
 1010 1015 1020
 Ala Val Ser Leu Val Glu Asp Leu Arg Gln Arg Gly Leu His Val
 1025 1030 1035
 Ser Val Arg Ala Leu Phe Ala Thr Pro Thr Pro Ala Ala Leu Ala
 1040 1045 1050
 Val Ser Thr Val Ala Ala Pro Ile Glu Val Pro Pro Asn Leu Ile
 1055 1060 1065
 Pro Gln Gly Gly Ala Arg Glu Leu Thr Pro Asp Met Leu Pro Leu
 1070 1075 1080
 Val Asp Leu Thr Gly Glu Glu Leu Ala Thr Ile Val Ala Ala Val
 1085 1090 1095
 Pro Gly Gly Ala Ala Asn Ile Ala Asp Ile Tyr Pro Leu Ala Pro

1100	1105	1110
Leu Gln Glu Gly Ile Phe Phe His His Leu Met Thr Glu Gly Asp 1115 1120 1125		
Thr Ala Asp Val Tyr Ala Leu Pro Tyr Leu Leu Arg Val Gly Thr 1130 1135 1140		
Arg Glu Gln Leu Asp Ala Phe Leu Gly Ala Leu Gln Gln Val Val 1145 1150 1155		
Asp Arg His Asp Val Tyr Arg Thr Ala Ile Ala Trp Gln Asn Leu 1160 1165 1170		
Arg Glu Pro Val Gln Val Val His Arg His Ala Thr Leu Pro Val 1175 1180 1185		
Thr Glu Val Thr Pro Asp Gln Leu His Ala Ala Ala Thr Gly Gly 1190 1195 1200		
Arg Leu Pro Leu Asp His Ala Pro Leu Leu Ser Val His Ile Ala 1205 1210 1215		
Pro Glu Pro Asp Gly Gly Trp Leu Ala Leu Leu Arg Met His His 1220 1225 1230		
Leu Val Gln Asp His Thr Ala Leu Asp Ile Val Leu Asp Glu Ile 1235 1240 1245		
Arg Thr Ile Leu Ala Gly Ala Thr Asp His Leu Pro Pro Pro Val 1250 1255 1260		
Pro Phe Arg Asn Phe Val Ala Arg Ser Arg Arg Gly Ala Ala Glu 1265 1270 1275		
Ala Ala His Arg Asp Tyr Phe Thr Gly Leu Leu Gly Asp Val Thr 1280 1285 1290		
Glu Thr Thr Ala Pro Tyr Gly Leu Thr Asp Val His Gly Glu His 1295 1300 1305		
Ser Gly Val Arg Arg Gly Arg Leu Ala Val Ser Ala Gly Leu Ala 1310 1315 1320		
Gly Arg Val Arg Glu Thr Ala Arg Asp Arg Gly Val Ser Pro Ala 1325 1330 1335		
Thr Leu Phe His Leu Ala Trp Ala Arg Val Leu Ala Ala Val Ser 1340 1345 1350		
Gly Arg Asp Asp Val Val Phe Gly Thr Val Leu Leu Gly Arg Met 1355 1360 1365		
Asp Ala Gly Pro Gly Ala Asp Arg Val Pro Gly Leu Phe Met Asn 1370 1375 1380		
Thr Leu Pro Val Arg Val Arg Leu Gly Gly Arg Thr Val Asp Glu 1385 1390 1395		
Ala Leu His Gly Met Arg Ala Gln Leu Ala Asp Leu Leu Thr His 1400 1405 1410		

Glu His	Ala Pro Leu Val	Leu	Ala Gln Gln Ser	Ala	Gly Leu Pro
1415		1420		1425	
Gly Gly	Ser Pro Leu Phe	Thr	Ser Leu Phe Asn Tyr	Arg His Asn	
1430		1435		1440	
Ala Thr	Asp Ile Glu Arg	Ser	Gly Thr Gly Ile Asp	Gly Val Glu	
1445		1450		1455	
Ala Leu	Pro Thr Gly Asp	Pro	Ser Asn Tyr Pro	Leu Asp Val Ser	
1460		1465		1470	
Val Asn	Gln Ser Pro Leu	Gly	Phe Glu Leu Val	Val Glu Ala Thr	
1475		1480		1485	
Glu Pro	Ala Asp Pro Asp	Gln	Leu Cys Arg Leu	Leu His Ala Cys	
1490		1495		1500	
Leu Asp	Asp Leu Ile Ala	Ala	Leu Asp Glu Gln	Pro Gly Arg Ala	
1505		1510		1515	
Leu Gly	Thr Leu Asp Val	Val	Ala Gly Arg Glu	Arg Asp Leu Leu	
1520		1525		1530	
Leu Asp	Gly Trp Asn Ala	Thr	Ala Val Pro Ala	Gln Pro Ala Leu	
1535		1540		1545	
Val Pro	Glu Leu Phe Thr	Ala	Gln Ala Ala Arg	Thr Pro Thr Trp	
1550		1555		1560	
Pro Ala	Leu Val Thr Ala	Gly	Ala Glu Met Ser	Tyr Ala Glu Leu	
1565		1570		1575	
Glu Glu	Arg Ser Asn Arg	Leu	Ala Arg Trp Leu	Ala Gly Arg Gly	
1580		1585		1590	
Val Gly	Ala Asp Asp Arg	Val	Ala Leu Met Met	Arg Arg Gly Pro	
1595		1600		1605	
Glu Leu	Met Val Ala Ile	Leu	Ala Val Leu Lys	Ala Gly Ala Ala	
1610		1615		1620	
Tyr Leu	Pro Val Asp Pro	Asp	Leu Pro Arg Asp	Arg Val Asp Tyr	
1625		1630		1635	
Leu Leu	Ala Asp Ala Ala	Pro	Ala Phe Val Leu	Ala Glu Arg Ala	
1640		1645		1650	
Thr Ala	Pro Trp Val Pro	Val	Ala Gly Gly Ile	Pro Val Leu Val	
1655		1660		1665	
Val Asp	Ala Pro Ala Val	Ala	Ala Glu Val Ala	Ala His Ser Gly	
1670		1675		1680	
Glu Ala	Val Thr Asp Arg	Asp	Arg Arg Ala Ala	Leu Arg Gly Gly	
1685		1690		1695	
His Leu	Ala Tyr Val Ile	Tyr	Thr Ser Gly Ser	Thr Gly Arg Pro	
1700		1705		1710	

Lys	Gly	Val	Leu	Ile	Thr	His	Asp	Gly	Leu	Ala	Asn	Leu	Thr	Leu
1715						1720					1725			
Asp	His	Gly	Arg	Phe	Gly	Leu	Gly	Pro	Gly	Ala	Arg	Val	Ala	Gln
1730						1735					1740			
Phe	Ala	Ser	Pro	Gly	Phe	Asp	Met	Phe	Val	Asp	Glu	Trp	Ser	Met
1745						1750					1755			
Ala	Leu	Leu	Ala	Gly	Ala	Ala	Leu	Thr	Phe	Val	Pro	Pro	Glu	Arg
1760						1765					1770			
Arg	Leu	Gly	Ala	Asp	Leu	Ala	Ala	Phe	Leu	Ala	Glu	Tyr	Gly	Val
1775						1780					1785			
Thr	His	Ala	Thr	Leu	Pro	Pro	Ala	Val	Val	Gly	Thr	Ile	Pro	Asp
1790						1795					1800			
Gly	Val	Leu	Pro	Pro	Ser	Phe	Val	Leu	Asp	Val	Gly	Gly	Asp	Val
1805						1810					1815			
Leu	Pro	Gly	Asp	Leu	Ala	Arg	Arg	Trp	Leu	Arg	Asp	Gly	Arg	Val
1820						1825					1830			
Leu	Phe	Asn	Ser	Tyr	Gly	Pro	Thr	Glu	Thr	Thr	Val	Asn	Ala	Ala
1835						1840					1845			
Thr	Trp	Arg	Ala	Glu	Ala	Gly	Asp	Trp	Gly	Ser	Val	Ala	Pro	Ile
1850						1855					1860			
Gly	Thr	Pro	Val	Pro	Asn	Leu	Arg	Ala	Tyr	Val	Leu	Asp	Gly	Trp
1865						1870					1875			
Leu	Arg	Pro	Val	Pro	Val	Gly	Ala	Asp	Gly	Glu	Leu	Tyr	Val	Ser
1880						1885					1890			
Gly	Ala	Gly	Leu	Ala	Arg	Gly	Tyr	Leu	Asn	Arg	Ala	Gly	Leu	Thr
1895						1900					1905			
Ala	Glu	Arg	Phe	Val	Ala	Cys	Pro	Phe	Glu	Pro	Gly	Glu	Arg	Met
1910						1915					1920			
Tyr	Arg	Thr	Gly	Asp	Val	Val	Arg	Trp	Thr	Ala	Glu	Gly	Arg	Leu
1925						1930					1935			
Val	Phe	Ala	Gly	Arg	Ser	Asp	Asp	Gln	Val	Lys	Ile	Arg	Gly	Phe
1940						1945					1950			
Arg	Ile	Glu	Pro	Gly	Glu	Val	Glu	Ala	Val	Leu	Ala	Ala	Gly	Pro
1955						1960					1965			
Gly	Val	Ser	Gln	Ala	Ala	Val	Ile	Val	Arg	Glu	Asp	Val	Pro	Gly
1970						1975					1980			
Asp	Lys	Arg	Leu	Val	Ala	Tyr	Val	Val	Gly	Gly	Asp	Val	Glu	Ala
1985						1990					1995			
Leu	Arg	Ser	Tyr	Ala	Gln	Gln	Arg	Leu	Pro	Gly	Tyr	Met	Val	Pro
2000						2005					2010			
Ser	Ala	Phe	Val	Glu	Leu	Asp	Arg	Leu	Pro	Leu	Thr	Val	Asn	Gly
2015						2020					2025			

Lys	Leu	Asp	Arg	Arg	Ala	Leu	Pro	Val	Pro	Asp	Leu	Ala	Arg	Gly
2030						2035					2040			
Thr	Gly	Ser	Gly	Arg	Pro	Ala	Gly	Thr	Pro	Arg	Glu	Gln	Leu	Leu
2045						2050					2055			
Cys	Ala	Gly	Phe	Ala	Ala	Val	Leu	Gly	Val	Asp	Asp	Val	Gly	Ala
2060						2065					2070			
Asp	Asp	Asp	Phe	Phe	Ala	Leu	Gly	Gly	His	Ser	Leu	Leu	Val	Val
2075						2080					2085			
Ser	Leu	Val	Glu	Trp	Leu	Arg	Arg	Arg	Gly	Val	Ser	Val	Pro	Val
2090						2095					2100			
Arg	Ala	Leu	Phe	Thr	Thr	Pro	Thr	Pro	Ala	Gly	Leu	Ala	Glu	Ala
2105						2110					2115			
Val	Gly	Asp	Gly	Ala	Val	Val	Val	Pro	Pro	Asn	Leu	Ile	Pro	Glu
2120						2125					2130			
Gly	Ala	Ala	Glu	Leu	Thr	Pro	Glu	Met	Val	Pro	Leu	Ala	Asp	Leu
2135						2140					2145			
Thr	Ser	Glu	Glu	Leu	Ala	Ile	Val	Val	Ala	Ser	Val	Pro	Gly	Gly
2150						2155					2160			
Ala	Ala	Asn	Val	Ala	Asp	Val	Tyr	Pro	Leu	Ala	Pro	Leu	Gln	Glu
2165						2170					2175			
Gly	Ile	Phe	Phe	Pro	Val	Ala	Thr	Gly	Pro	Gln	Cys	Tyr	Ala	Thr
2180						2185					2190			
Val	Gly	Ser	Ser	Leu	Pro	Asp	Asp	Gly	Gly	Ser	Ala	Pro	Cys	Ser
2195						2200					2205			
Arg	Phe	Arg	Arg	Arg	Cys	Val	Ser	Thr	Ser	Val	Val	Trp	Gln	Gly
2210						2215					2220			
Leu	Arg	Glu	Pro	Val	Gln	Val	Val	Trp	Arg	His	Ala	Arg	Leu	Pro
2225						2230					2235			
Val	Glu	Glu	Val	Val	Leu	His	Glu	Gly	Ala	Asp	Pro	Val	Glu	Gln
2240						2245					2250			
Met	Met	Ala	Leu	Ala	Gly	Gly	Trp	Met	Asp	Leu	Thr	Arg	Ala	Pro
2255						2260					2265			
Leu	Ile	Asp	Val	His	Ile	Ala	Ala	Gly	Pro	Gly	Gly	Asp	Arg	Trp
2270						2275					2280			
Leu	Ala	Val	Leu	Arg	Ile	His	His	Leu	Val	Gln	Asp	His	Thr	Ala
2285						2290					2295			
Leu	Glu	Thr	Leu	Leu	Asp	Glu	Leu	Gln	Ser	Phe	Leu	Glu	Gly	Arg
2300						2305					2310			
Gly	Gly	Glu	Leu	Ala	Glu	Pro	Val	Pro	Phe	Arg	Glu	Phe	Val	Ala
2315						2320					2325			

Gln	Ala	Arg	Leu	Gly	Val	Pro	Arg	Glu	Glu	His	Glu	Arg	Tyr	Phe
2330						2335					2340			
Ala	Glu	Leu	Leu	Gly	Asp	Ile	Thr	Glu	Thr	Thr	Ala	Pro	Tyr	Asp
2345						2350					2355			
Leu	Thr	Asp	Val	His	Gly	Asp	Gly	Thr	Gly	Tyr	Asp	His	Gly	Ala
2360						2365					2370			
Leu	Pro	Leu	Asp	Ala	Thr	Val	Ala	Ala	Arg	Val	Arg	Glu	Ala	Ala
2375						2380					2385			
Arg	Thr	Leu	Gly	Val	Ser	Pro	Ala	Thr	Leu	Phe	His	Leu	Ala	Trp
2390						2395					2400			
Ala	Arg	Val	Leu	Gly	Thr	Leu	Ala	Gly	Arg	Asp	Asp	Val	Val	Phe
2405						2410					2415			
Gly	Thr	Val	Leu	Phe	Gly	Arg	Met	Asn	Ser	Gly	Ala	Gly	Ala	Asp
2420						2425					2430			
Arg	Val	Ser	Gly	Leu	Phe	Ile	Asn	Thr	Leu	Pro	Val	Arg	Val	Arg
2435						2440					2445			
Leu	Gly	Ala	Pro	Thr	Gly	Asp	Ala	Leu	Gly	Asp	Leu	Arg	Asp	Gln
2450						2455					2460			
Leu	Ala	Glu	Leu	Leu	Val	His	Glu	His	Ala	Ser	Leu	Ala	Ser	Ala
2465						2470					2475			
Gln	Lys	Ala	Ser	Gly	Leu	Pro	Gly	Gly	Ser	Pro	Leu	Phe	Thr	Ser
2480						2485					2490			
Ile	Phe	Asn	Tyr	Arg	His	Asn	Gln	Val	Ser	Ala	Glu	Arg	Glu	Thr
2495						2500					2505			
Ala	Ala	Leu	Pro	Gly	Ile	Arg	Val	Leu	Ala	Ala	Arg	Asp	Ser	Thr
2510						2515					2520			
Asn	Tyr	Pro	Leu	Thr	Val	Ala	Val	Asp	Asp	Asp	Gly	His	Gly	Phe
2525						2530					2535			
Thr	Leu	Val	Val	Glu	Val	Ala	Ser	Thr	Val	Asp	Ala	Ala	Gly	Val
2540						2545					2550			
Cys	Glu	Leu	Leu	His	Thr	Ala	Val	Asp	Asn	Leu	Ile	Ala	Ala	Leu
2555						2560					2565			
Thr	Asp	Arg	Pro	Gly	Gly	Pro	Leu	Ala	Glu	Val	Asp	Ile	Leu	Glu
2570						2575					2580			
Arg	Gly	Leu	Arg	Asp	Arg	Leu	Leu	Thr	Ala	Trp	Asn	Glu	Ala	Arg
2585						2590					2595			
Glu	Pro	Ala	Pro	Pro	Val	Thr	Leu	Pro	Asp	Leu	Phe	Asp	Arg	Gln
2600						2605					2610			
Ala	Arg	Arg	Thr	Pro	Glu	Ala	Val	Ala	Leu	Thr	Ala	Asp	Gly	Val
2615						2620					2625			
Ser	Leu	Thr	Tyr	Arg	Glu	Leu	Ser	Glu	Arg	Ala	Asn	Arg	Ile	Ala

2630						2635						2640
Arg	Leu	Leu	Thr	Ser	Arg	Gly	Ile	Gly	Pro	Glu	Ser	Leu Val Gly
2645						2650					2655	
Val	Val	Leu	Pro	Arg	Ser	Ala	Asp	Leu	Val	Val	Ala	Leu Leu Gly
2660						2665					2670	
Val	Leu	Gln	Ala	Gly	Ala	Ala	Tyr	Val	Pro	Val	Asp	Ala Asp Tyr
2675						2680					2685	
Pro	Ala	Glu	Arg	Ile	Gly	Tyr	Ile	Leu	Gly	Asp	Ala	Gly Ala Val
2690						2695					2700	
Cys	Val	Leu	Thr	Val	Asp	Ala	Thr	Ala	Gly	Ala	Val	Pro Pro Gly
2705						2710					2715	
Val	Pro	Lys	Leu	Val	Leu	Asp	His	Pro	Glu	Thr	Val	Thr Ala Leu
2720						2725					2730	
Ala	Ala	Cys	Asp	Thr	Ala	Pro	Leu	Gly	Glu	Ala	Glu	Arg Ala Gly
2735						2740					2745	
Glu	Leu	Leu	Pro	Glu	His	Pro	Ala	Tyr	Val	Ile	Tyr	Thr Ser Gly
2750						2755					2760	
Ser	Thr	Gly	Thr	Pro	Lys	Gly	Val	Leu	Ile	Pro	His	Arg Asn Val
2765						2770					2775	
Val	Glu	Leu	Phe	Ala	Ala	Thr	Arg	Gly	Ser	Phe	His	Phe Gly Glu
2780						2785					2790	
Gly	Asp	Val	Trp	Ser	Trp	Phe	His	Ser	Val	Ala	Phe	Asp Phe Ser
2795						2800					2805	
Val	Trp	Glu	Leu	Trp	Gly	Ala	Leu	Leu	His	Gly	Gly	Arg Val Val
2810						2815					2820	
Met	Val	Pro	Phe	Ala	Val	Ser	Arg	Ser	Pro	Arg	Asp	Phe Trp Glu
2825						2830					2835	
Leu	Leu	Val	Arg	Glu	Arg	Val	Thr	Val	Leu	Ser	Gln	Thr Pro Ser
2840						2845					2850	
Ala	Phe	Tyr	Gln	Leu	Ala	Ala	Ala	Ala	Asp	Asp	Thr	Pro Asp Ala
2855						2860					2865	
Leu	Arg	Val	Val	Val	Phe	Gly	Gly	Glu	Ala	Leu	Asp	Pro Gly Arg
2870						2875					2880	
Leu	Ala	Gly	Trp	Arg	Glu	Arg	Arg	Pro	Asp	Gly	Pro	Arg Leu Val
2885						2890					2895	
Asn	Met	Tyr	Gly	Ile	Thr	Glu	Thr	Thr	Val	His	Val	Thr His Gln
2900						2905					2910	
Asp	Leu	Ala	Pro	Ala	Asp	Thr	Thr	Gly	Ser	Pro	Ile	Gly Arg Gly
2915						2920					2925	
Ile	Pro	Gly	Leu	Ser	Val	Tyr	Val	Leu	Asp	Glu	Ala	Leu Arg Pro
2930						2935					2940	

Val	Pro	Pro	Gly	Val	Ala	Gly	Glu	Val	Tyr	Val	Ala	Gly	Arg	Gln
2945						2950					2955			
Leu	Ala	Arg	Ala	Tyr	Leu	Gly	Arg	Ala	Ala	Leu	Thr	Gly	Thr	Arg
2960						2965					2970			
Phe	Val	Ala	Cys	Pro	Phe	Leu	Pro	Ala	Gly	Glu	Arg	Met	Tyr	Arg
2975						2980					2985			
Thr	Gly	Asp	Arg	Ala	Arg	Trp	Ser	Arg	Gly	Arg	Leu	Gln	Phe	Ala
2990						2995					3000			
Gly	Arg	Thr	Asp	Asp	Gln	Val	Gln	Ile	Arg	Gly	Phe	Arg	Ile	Glu
3005						3010					3015			
Pro	Gly	Glu	Val	Gln	Ala	Val	Val	Ala	Ala	His	Pro	Glu	Ile	Ala
3020						3025					3030			
Ala	Ala	Ala	Val	Val	Val	Arg	Glu	Asp	Val	Pro	Gly	Asp	Pro	Arg
3035						3040					3045			
Leu	Thr	Ala	Tyr	Val	Val	Pro	Ala	Gly	Pro	Arg	Thr	Ala	Pro	Ala
3050						3055					3060			
Ala	Val	Ala	Glu	Thr	Val	Arg	Arg	Phe	Ala	Ala	Asp	Arg	Leu	Pro
3065						3070					3075			
Ala	Tyr	Met	Leu	Pro	Ser	Ala	Val	Val	Val	Leu	Asp	Ala	Leu	Pro
3080						3085					3090			
Leu	Thr	Asp	His	Gly	Lys	Leu	Asp	Arg	Arg	Ala	Leu	Pro	Ala	Pro
3095						3100					3105			
Gln	His	Thr	Gly	Ala	Ala	Ser	Gly	Arg	Ala	Pro	Ala	Thr	Val	Ala
3110						3115					3120			
Glu	Glu	Val	Leu	Cys	Ala	Ala	Phe	Ala	Glu	Val	Leu	Gly	Val	Glu
3125						3130					3135			
Arg	Val	Gly	Val	Asp	Asp	Asp	Phe	Phe	Ala	Leu	Gly	Gly	His	Ser
3140						3145					3150			
Leu	Leu	Ile	Val	Ser	Leu	Val	Glu	Arg	Val	Arg	Arg	Ala	Gly	Leu
3155						3160					3165			
Ala	Ile	Pro	Val	Arg	Ala	Leu	Phe	Arg	Ser	Ala	Thr	Pro	Ala	Gly
3170						3175					3180			
Leu	Ala	Ala	Leu	Ala	Arg	Pro	Tyr	Arg	Val	Asp	Ile	Pro	Pro	Asn
3185						3190					3195			
Leu	Val	Pro	Asp	Gly	Ala	Arg	Glu	Ile	Thr	Pro	Asp	Met	Leu	Thr
3200						3205					3210			
Leu	Ala	Ala	Leu	Thr	Glu	Ala	Glu	Ile	Ala	Thr	Val	Leu	Ala	Thr
3215						3220					3225			
Val	Pro	Gly	Gly	Ala	Val	Asn	Val	Ala	Asp	Ile	Tyr	Pro	Leu	Ala
3230						3235					3240			
Pro	Leu	Gln	Glu	Gly	Ile	Phe	Phe	His	His	Leu	Met	Ala	Asp	Ala

3245	3250	3255
Gly Arg Ala Asp Ala Tyr	Ala Met Pro Tyr Val	Leu His Leu Asp
3260	3265	3270
Thr Ala Glu Arg Leu Asp	Val Leu Leu Gly Ala	Leu Gln Arg Val
3275	3280	3285
Ile Asp Arg Asn Asp Ile	Tyr Arg Thr Gly Val	Val Ser Ala Gly
3290	3295	3300
Leu Arg Glu Pro Val Gln	Val Val Trp Arg Ser	Ala Val Leu Pro
3305	3310	3315
Val Glu Glu Val Ala Leu	Asp Gly Gly His Asp	Pro Val Glu Gln
3320	3325	3330
Leu Leu Ala Ala Ala Gly	Glu Glu Phe Asp Leu	Thr Arg Ala Pro
3335	3340	3345
Leu Ile Arg Ala His Val	Ala Ala His Pro Asp	Gly Gly Arg Leu
3350	3355	3360
Leu Leu Leu Arg Ile His	His Leu Val Gln Asp	His Thr Thr Phe
3365	3370	3375
Asp Val Val Leu Gly Glu	Leu Arg Ala Phe Leu	Glu Gly Arg Gly
3380	3385	3390
Gly Glu Leu Ala Glu Pro	Val Pro Phe Arg Glu	Phe Val Ala Gln
3395	3400	3405
Ala Arg Leu Gly Val Pro	Arg Glu Glu His Glu	Arg Tyr Phe Ala
3410	3415	3420
Glu Leu Leu Gly Asp Val	Thr Glu Thr Thr Ala	Pro Tyr Gly Leu
3425	3430	3435
Thr Asp Val His Gly Asp	Gly Ser Arg Ala Val	Gln Val Ser Leu
3440	3445	3450
Pro Val Ala Glu Ala Leu	Ala Val Arg Val Arg	Glu Val Ala Arg
3455	3460	3465
Thr Leu Gly Val Ser Pro	Ala Thr Val Phe His	Leu Ala Trp Ala
3470	3475	3480
Arg Val Leu Ser Val Ile	Ala Gly Arg Asp Asp	Val Val Phe Gly
3485	3490	3495
Thr Ile Leu Phe Gly Arg	Met Asn Ser Gly Ala	Ala Ala Glu Arg
3500	3505	3510
Val Pro Gly Leu Phe Ile	Asn Thr Leu Pro Val	Arg Val Arg Leu
3515	3520	3525
Asn Gly Thr Ser Val Gly	Glu Ala Leu Thr Ala	Leu Arg Asp Gln
3530	3535	3540
Met Ala Glu Leu Met Ala	His Glu His Ala Pro	Leu Ala Leu Ala
3545	3550	3555

Gln	Arg	Ala	Gly	Gly	Val	Pro	Ala	Gly	Ser	Pro	Leu	Phe	Thr	Ser
3560						3565					3570			
Leu	Phe	Asn	Tyr	Arg	His	Asn	Val	Ala	Gly	Gly	Gly	Asp	Gly	Gly
3575						3580					3585			
Ala	Leu	Glu	Gly	Val	Thr	Pro	Val	Leu	His	Arg	Asp	Thr	Thr	Asn
3590						3595					3600			
Tyr	Pro	Val	Val	Val	Ser	Val	Asp	Asp	Asp	Gly	Thr	Ser	Phe	Asp
3605						3610					3615			
Leu	Val	Val	Glu	Ala	Val	Ala	Pro	Ala	Glu	Ala	Gly	Arg	Val	Gly
3620						3625					3630			
Arg	Leu	Met	His	Glu	Cys	Leu	Ala	Glu	Leu	Val	Gly	Ala	Leu	Ala
3635						3640					3645			
Gly	Ala	Pro	Glu	Thr	Pro	Leu	Ser	Arg	Val	Arg	Val	Ile	Asp	Glu
3650						3655					3660			
Ala	Glu	Ile	Glu	Arg	Val	Val	His	Ser	Trp	Asn	Asp	Thr	Ala	Arg
3665						3670					3675			
Pro	Val	Val	Glu	Ser	Ser	Val	Pro	Ala	Leu	Phe	Ala	Glu	Gln	Val
3680						3685					3690			
Ala	Ala	Ala	Pro	Asp	Ala	Thr	Ala	Val	Val	Gly	Glu	Gly	Val	Ser
3695						3700					3705			
Trp	Ser	Tyr	Arg	Glu	Leu	Asp	Ala	Arg	Ser	Asp	Ala	Leu	Ala	Arg
3710						3715					3720			
Ser	Leu	Val	Ala	Ala	Gly	Val	Gly	Val	Glu	Ser	Pro	Val	Val	Val
3725						3730					3735			
Ala	Leu	Glu	Arg	Ser	Pro	Glu	Val	Leu	Ser	Ala	Phe	Leu	Ala	Val
3740						3745					3750			
Ala	Lys	Ala	Gly	Gly	Val	Phe	Val	Pro	Val	Asp	Leu	Ser	Trp	Pro
3755						3760					3765			
Gln	Ala	Arg	Ile	Asp	Ala	Val	Val	Ala	Asp	Cys	Ala	Ala	Arg	Val
3770						3775					3780			
Ala	Val	Ala	Asp	Arg	Pro	Met	Ser	Gly	Leu	Thr	Val	Val	Pro	Ala
3785						3790					3795			
Asp	Gln	Val	Gly	Asp	Ser	Ala	Val	Val	Leu	Pro	Ala	Gly	Pro	Val
3800						3805					3810			
Pro	Gly	Ala	Ala	Val	Tyr	Arg	Met	Tyr	Thr	Ser	Gly	Ser	Thr	Gly
3815						3820					3825			
Arg	Pro	Lys	Gly	Val	Val	Thr	Thr	His	Gln	Asn	Leu	Val	Asp	Leu
3830						3835					3840			
Ala	Thr	Asp	Thr	Cys	Trp	Gly	Pro	Thr	Pro	Arg	Val	Leu	Phe	His
3845						3850					3855			

Ala	Pro	His	Ala	Phe	Asp	Ala	Ser	Ser	Tyr	Glu	Ile	Trp	Val	Pro
3860						3865					3870			
Leu	Leu	Asn	Gly	Gly	Thr	Val	Val	Val	Ala	Pro	Gln	Arg	Ser	Ile
3875						3880					3885			
Asp	Ala	Thr	Val	Leu	Arg	Asp	Leu	Ile	Arg	Gly	His	Glu	Leu	Thr
3890						3895					3900			
His	Val	His	Val	Thr	Ala	Gly	Leu	Leu	Arg	Val	Leu	Asp	Pro	Ser
3905						3910					3915			
Cys	Phe	Ala	Gly	Leu	Thr	Glu	Val	Leu	Thr	Gly	Gly	Asp	Ala	Val
3920						3925					3930			
Ser	Ala	Glu	Ala	Val	Arg	Arg	Val	Arg	Glu	Ala	Asn	Pro	Gly	Leu
3935						3940					3945			
Arg	Val	Arg	Gln	Leu	Tyr	Gly	Pro	Thr	Glu	Val	Thr	Leu	Cys	Ala
3950						3955					3960			
Thr	Gln	His	Leu	Leu	Val	Asp	Gly	Val	Pro	Ile	Gly	Arg	Pro	Leu
3965						3970					3975			
Asp	Asn	Thr	Arg	Val	Tyr	Val	Leu	Asp	Asp	Leu	Leu	Gln	Pro	Val
3980						3985					3990			
Pro	Val	Gly	Val	Thr	Gly	Glu	Leu	Tyr	Val	Ala	Gly	Ala	Gly	Leu
3995						4000					4005			
Ala	Arg	Gly	Tyr	Ala	Gly	Met	Pro	Gly	Leu	Thr	Ala	Glu	Arg	Phe
4010						4015					4020			
Val	Ala	Asp	Pro	Phe	Ser	Val	Gly	Gly	Arg	Leu	Tyr	Arg	Thr	Gly
4025						4030					4035			
Asp	Leu	Val	Arg	Trp	Thr	Asp	Asp	Gly	Val	Leu	His	Phe	Ala	Gly
4040						4045					4050			
Arg	Ala	Asp	Asp	Gln	Val	Lys	Ile	Arg	Gly	Tyr	Arg	Val	Glu	Pro
4055						4060					4065			
Gly	Glu	Val	Glu	Ala	Val	Leu	Ala	Gln	His	Pro	Asp	Val	Ser	Gln
4070						4075					4080			
Val	Ala	Val	Val	Val	Arg	Glu	Asp	Thr	Pro	Gly	Asp	Lys	Arg	Leu
4085						4090					4095			
Val	Ala	Tyr	Val	Val	Gly	Gly	Asp	Val	Glu	Ala	Tyr	Ala	Gln	Glu
4100						4105					4110			
Arg	Leu	Pro	Gly	Tyr	Leu	Val	Pro	Ser	Ala	Phe	Val	His	Leu	Asp
4115						4120					4125			
Ala	Leu	Pro	Leu	Thr	Ser	Asn	Gln	Lys	Val	Asp	Arg	Ala	Ala	Leu
4130						4135					4140			
Pro	Ala	Pro	Ser	Val	Glu	Ser	Gly	Val	Gly	Arg	Ala	Pro	Ala	Asp
4145						4150					4155			
Ala	Arg	Glu	Glu	Leu	Met	Cys	Ala	Ala	Phe	Ala	Glu	Val	Leu	Asp

4160	4165	4170
Leu Asp Arg Val Gly Val	Asp Asp Asp Phe Phe	Ala Leu Gly Gly
4175	4180	4185
His Ser Leu Leu Val Val	Arg Leu Val Gly Arg	Ile Arg Gln Val
4190	4195	4200
Phe Gly Val Glu Val Ser	Ala Arg Leu Val Phe	Asp Ala Arg Thr
4205	4210	4215
Pro Ala Gly Val Val Ala	Arg Leu Ser Glu Gly	Gly Thr Ala Arg
4220	4225	4230
Glu Ala Val Arg Ala Arg	Val Arg Pro Ala Arg	Val Pro Leu Ser
4235	4240	4245
Phe Ala Gln Arg Arg Leu	Trp Phe Leu Ser Gln	Leu Glu Gly Pro
4250	4255	4260
Ser Ala Thr Tyr Asn Ile	Pro Val Ala Leu Arg	Leu Asp Gly Pro
4265	4270	4275
Leu Asp Arg Asp Ala Leu	Thr Ala Ala Leu His	Asp Val Val Ala
4280	4285	4290
Arg His Glu Val Leu Arg	Thr Val Phe Thr Val	Ala Asp Gly Glu
4295	4300	4305
Pro Trp Gln Gln Ile Leu	Asp Asp Pro Gln Val	Ser Val Pro Val
4310	4315	4320
Val Glu Val Thr Pro Asp	Arg Leu Pro Glu Ala	Val Ala Val Ala
4325	4330	4335
Ala Gly His Arg Phe Asp	Leu Gly Arg Glu Leu	Pro Leu Arg Ala
4340	4345	4350
Val Leu Leu Ala Thr Gly	Asp Asp Val His Val	Leu Val Leu Val
4355	4360	4365
Val His His Ile Ala Ala	Asp Gly Trp Ser Met	Arg Pro Leu Ala
4370	4375	4380
Arg Asp Leu Ala Ala Ala	Tyr Ala Ala Arg Ile	Asp Ala Thr Ala
4385	4390	4395
Pro Ala Leu Gly Ala Leu	Pro Val Gln Tyr Ala	Asp Tyr Ala Leu
4400	4405	4410
Trp Gln Arg Asp Val Leu	Gly Ser Glu His Asp	Pro Asp Ser Val
4415	4420	4425
Ile Ser Gln Gln Val Ala	Tyr Trp Arg Arg Gln	Leu Ala Gly Val
4430	4435	4440
Pro Glu Glu Leu Asp Leu	Pro Val Asp Arg Ala	Arg Pro Ala Glu
4445	4450	4455
Ala Ser His Arg Gly His	Thr Val Glu Phe Ala	Val Pro Pro Ala
4460	4465	4470

Val	His	His	Gln	Leu	Ala	Glu	Leu	Ala	Arg	Arg	Asn	Gly	Val	Thr
4475						4480					4485			
Val	Phe	Met	Thr	Val	Gln	Thr	Ala	Leu	Ala	Val	Leu	Leu	Ser	Lys
4490						4495					4500			
Leu	Gly	Ala	Gly	Thr	Asp	Ile	Pro	Ile	Gly	Val	Ala	Val	Ala	Gly
4505						4510					4515			
Arg	Thr	Asp	Pro	Thr	Leu	Asp	Asn	Leu	Ile	Gly	Phe	Phe	Val	Asn
4520						4525					4530			
Thr	Leu	Val	Leu	Arg	Thr	Asp	Leu	Thr	Gly	Asn	Pro	Thr	Ile	Thr
4535						4540					4545			
Asp	Leu	Leu	His	Arg	Thr	Arg	Asp	Thr	Thr	Leu	His	Ala	Phe	Thr
4550						4555					4560			
His	Gln	Asp	Val	Pro	Phe	Glu	Lys	Leu	Val	Glu	Asp	Leu	Ala	Pro
4565						4570					4575			
Thr	Arg	Ser	Leu	Ala	Arg	His	Pro	Leu	Phe	Gln	Val	Met	Met	Thr
4580						4585					4590			
Leu	Gln	Ser	Ala	Ser	Ala	Asp	Glu	Glu	Pro	Leu	Ala	Leu	Ala	Gly
4595						4600					4605			
Leu	Arg	Val	Thr	Asp	Leu	Pro	Ala	Gly	Glu	Thr	Pro	Ala	Lys	Val
4610						4615					4620			
Asp	Leu	Asp	Leu	Thr	Leu	His	Glu	Val	Ala	Gly	Arg	Asp	Gly	Met
4625						4630					4635			
His	Ala	Thr	Leu	Leu	Gly	Ala	Ala	Asp	Leu	Phe	Glu	Gln	Glu	Thr
4640						4645					4650			
Val	Arg	Ala	Leu	Ala	Asp	Arg	Leu	Leu	Arg	Thr	Leu	Glu	Ala	Met
4655						4660					4665			
Ala	Ala	Ala	Pro	Asp	Asp	Arg	Leu	Asp	Arg	Ile	Glu	Val	Leu	Ser
4670						4675					4680			
Pro	Gly	Glu	Arg	Ser	Arg	Leu	Leu	Val	Glu	Trp	Asn	Asp	Thr	Ala
4685						4690					4695			
Arg	Pro	Val	Val	Glu	Ser	Ser	Val	Pro	Ala	Leu	Phe	Ala	Glu	Gln
4700						4705					4710			
Val	Ala	Ala	Ala	Pro	Asp	Ala	Val	Ala	Val	Val	Gly	Glu	Gly	Val
4715						4720					4725			
Ser	Trp	Thr	Tyr	Arg	Glu	Leu	Asp	Ala	Arg	Ser	Asp	Ala	Leu	Ala
4730						4735					4740			
Arg	Ser	Leu	Val	Ala	Ala	Gly	Val	Gly	Val	Glu	Ser	Pro	Val	Val
4745						4750					4755			
Val	Ala	Leu	Glu	Arg	Ser	Pro	Glu	Val	Leu	Ser	Ala	Phe	Leu	Ala
4760						4765					4770			
Val	Ala	Lys	Ala	Gly	Gly	Val	Phe	Val	Pro	Val	Asp	Leu	Ser	Trp

4775	4780	4785
Pro Gln Ala Arg Val Asp 4790	Ala Val Val Ala Asp 4795	Cys Gly Ala Arg 4800
Ile Ala Val Ala Asp Arg 4805	Pro Met Ser Gly Leu 4810	Thr Val Val Ser 4815
Ala Gly Leu Gly Gly Asp 4820	Ser Ala Val Val Ser 4825	Gly Asp Leu Thr 4830
Ala Asp Arg Ala Val Val 4835	Leu Pro Ala Gly Pro 4840	Val Pro Gly Ala 4845
Ala Val Tyr Arg Met Tyr 4850	Thr Ser Gly Ser Thr 4855	Gly Arg Pro Lys 4860
Gly Val Val Thr Thr His 4865	Gln Asn Leu Val Asp 4870	Leu Ala Thr Asp 4875
Thr Cys Trp Gly Pro Thr 4880	Pro Arg Val Leu Phe 4885	His Ala Pro His 4890
Ala Phe Asp Ala Ser Ser 4895	Tyr Glu Ile Trp Val 4900	Pro Leu Leu Asn 4905
Gly Gly Thr Val Val Val 4910	Ala Pro Arg Arg Ser 4915	Ile Asp Ala Thr 4920
Val Leu Arg Asp Leu Ile 4925	Gly Ala His Glu Leu 4930	Thr His Val His 4935
Val Thr Ala Gly Leu Leu 4940	Arg Val Leu Asp Pro 4945	Ser Cys Phe Ala 4950
Gly Leu Thr Glu Val Leu 4955	Thr Gly Gly Asp Ala 4960	Val Ser Ala Glu 4965
Ala Val Arg Arg Val Lys 4970	Asp Ala Asn Pro Gly 4975	Leu Arg Val Arg 4980
Gln Leu Tyr Gly Pro Thr 4985	Glu Val Thr Leu Cys 4990	Ala Thr Gln His 4995
Leu Leu Asp Asp Gly Val 5000	Pro Ile Gly Arg Pro 5005	Leu Asp Asn Thr 5010
Arg Val Tyr Val Leu Asp 5015	Asp Leu Leu Arg Pro 5020	Val Pro Thr Gly 5025
Val Val Gly Glu Leu Tyr 5030	Val Ala Gly Ser Gly 5035	Leu Ala Arg Gly 5040
Tyr Ala Gly Met Pro Gly 5045	Leu Thr Ala Glu Arg 5050	Phe Val Ala Asp 5055
Pro Phe Asn Thr Gly Gly 5060	Arg Leu Tyr Arg Thr 5065	Gly Asp Leu Val 5070
Arg Trp Ala Asp Asp Gly 5075	Val Leu His Phe Ala 5080	Gly Arg Ala Asp 5085

Asp	Gln	Val	Lys	Ile	Arg	Gly	Tyr	Arg	Val	Glu	Pro	Gly	Glu	Val
5090						5095					5100			
Glu	Ala	Val	Leu	Ala	Gln	His	Pro	Asp	Val	Ser	Gln	Val	Ala	Val
5105						5110					5115			
Val	Val	Arg	Glu	Asp	Thr	Pro	Gly	Asp	Lys	Arg	Leu	Val	Ala	Tyr
5120						5125					5130			
Val	Val	Gly	Gly	Asp	Val	Glu	Ala	Tyr	Ala	Gln	Glu	Arg	Leu	Pro
5135						5140					5145			
Gly	Tyr	Met	Val	Pro	Ser	Ala	Phe	Val	Gln	Leu	Asp	Ala	Leu	Pro
5150						5155					5160			
Leu	Thr	Ser	Asn	Gln	Lys	Val	Asp	Arg	Ala	Ala	Leu	Pro	Ala	Pro
5165						5170					5175			
Ser	Met	Glu	Ser	Gly	Ala	Gly	Arg	Ala	Pro	Ala	Asp	Ala	Arg	Glu
5180						5185					5190			
Glu	Leu	Met	Cys	Ala	Ala	Phe	Ala	Glu	Val	Leu	Asp	Leu	Asp	Arg
5195						5200					5205			
Val	Gly	Val	Asp	Asp	Asp	Phe	Phe	Ala	Leu	Gly	Gly	His	Ser	Leu
5210						5215					5220			
Leu	Ala	Val	Ser	Leu	Val	Glu	Asn	Leu	Arg	Arg	His	Gly	Val	His
5225						5230					5235			
Ile	Ser	Val	Arg	Ala	Leu	Phe	Ala	Thr	Pro	Thr	Pro	Ala	Ala	Leu
5240						5245					5250			
Ala	Ala	Ser	Ala	Gly	Thr	Ala	Val	Pro	Asp	Val	Pro	Pro	Asn	Leu
5255						5260					5265			
Ile	Pro	Gln	Gly	Gly	Ala	Gln	Glu	Leu	Thr	Pro	Asp	Met	Leu	Pro
5270						5275					5280			
Leu	Val	Asp	Leu	Thr	Gly	Glu	Glu	Leu	Ala	Thr	Ile	Val	Ala	Ala
5285						5290					5295			
Val	Pro	Gly	Gly	Ala	Pro	Asn	Ile	Ala	Asp	Ile	Tyr	Pro	Leu	Ala
5300						5305					5310			
Pro	Leu	Gln	Glu	Gly	Ile	Phe	Phe	His	His	Leu	Met	Thr	Glu	Gly
5315						5320					5325			
Asp	Ala	Thr	Asp	Val	Tyr	Leu	Leu	Pro	Arg	Ile	Leu	Gly	Phe	Gly
5330						5335					5340			
Gly	Arg	Pro	Glu	Leu	Asp	Ala	Phe	Leu	Gly	Ala	Leu	Gln	Gln	Val
5345						5350					5355			
Val	Asp	Arg	His	Asp	Val	Tyr	Arg	Thr	Ala	Ile	Ala	Trp	Gln	Asn
5360						5365					5370			
Leu	Arg	Glu	Pro	Val	Gln	Val	Val	His	Arg	His	Ala	Thr	Leu	Pro
5375						5380					5385			

Val Thr Glu	Val Thr Pro Asp	Gln Leu His Ala	Ala Ala	Ala Thr Gly
5390	5395		5400	
Gly Arg Leu	Pro Leu Asp His	Ala Pro Leu Leu	Ser	Val His Ile
5405	5410		5415	
Ala Pro Glu	Pro Asp Gly Gly	Trp Leu Ala Leu	Leu	Arg Met His
5420	5425		5430	
His Leu Val	Gln Asp His Thr	Ala Leu Asp Ile	Val	Leu Asp Glu
5435	5440		5445	
Ile Arg Thr	Ile Leu Ala Gly	Ala Thr Asp His	Leu	Pro Pro Pro
5450	5455		5460	
Val Pro Phe	Arg Asp Phe Val	Ala Gln Ala Arg	Leu	Gly Val Ser
5465	5470		5475	
Arg Ala Glu	Gln Glu Arg Tyr	Phe Ala Gly Leu	Leu	Gly Asp Val
5480	5485		5490	
Thr Glu Thr	Thr Ala Pro Tyr	Gly Leu Ala Asp	Val	Thr Asn Asp
5495	5500		5505	
Gly Thr Ala	Ser Val Arg Ala	Glu Val Glu Leu	Asp	Ala Ala Leu
5510	5515		5520	
Ala Ala Arg	Leu Arg Asp Leu	Ala Arg Asp Arg	Gly	Val Ser Pro
5525	5530		5535	
Ala Thr Val	Phe His Leu Ala	Trp Ala Arg Val	Leu	Ala Ala Val
5540	5545		5550	
Ala Asp Arg	Glu Asp Val Val	Phe Gly Thr Val	Leu	Phe Gly Arg
5555	5560		5565	
Met Ala Ser	Gly Ala Arg Arg	Val Pro Gly Leu	Phe	Met Asn Thr
5570	5575		5580	
Leu Pro Val	Arg Val Arg Leu	Ser Gly Thr Ala	Ala	Glu Ala Leu
5585	5590		5595	
Gly Gln Val	Arg Asp Arg Leu	Ala Glu Leu Met	Ala	His Glu His
5600	5605		5610	
Ala Pro Leu	Ala Leu Ala Gln	Gln Ala Ser Gly	Leu	Pro Ala Gly
5615	5620		5625	
Ser Pro Leu	Phe Thr Ser Leu	Phe Asn Tyr Arg	Tyr	Ala Arg Pro
5630	5635		5640	
Pro Ala Ala	Thr Pro Asp Asp	Pro Leu Ala Gly	Val	Arg Thr Leu
5645	5650		5655	
Phe Ala Trp	Glu Arg Asn Asn	Tyr Pro Val Thr	Val	Ser Ile Asp
5660	5665		5670	
Asp Asp Gly	Thr Gly Phe Ala	Val Thr Val Asp	Val	Val Ala Pro
5675	5680		5685	
Ala Asp Ala	Asp Glu Val Val	Arg Leu Leu Arg	Thr	Thr Leu Thr
5690	5695		5700	

Arg	Leu	Ala	Ala	Ala	Leu	Glu	Arg	Thr	Pro	Glu	Met	Pro	Val	Ala
5705						5710					5715			
Asp	Val	Arg	Pro	Gly	Arg	Val	Ser	Arg	Pro	Ala	Ala	Gly	Arg	Ala
5720						5725					5730			
Val	Leu	Val	Pro	Val	Pro	Ala	Gly	Glu	Arg	Ala	Thr	Gly	Ala	Gly
5735						5740					5745			
Arg	Ala	Pro	Ala	Thr	Ala	Tyr	Glu	Glu	Leu	Ile	Cys	Gln	Ala	Tyr
5750						5755					5760			
Ala	Gln	Val	Leu	Glu	Val	Asp	Arg	Val	Ala	Ala	Asp	Asp	Asp	Phe
5765						5770					5775			
Phe	Ala	Leu	Gly	Gly	Asn	Ser	Leu	Leu	Ala	Thr	Arg	Leu	Val	Ser
5780						5785					5790			
Arg	Ile	Arg	Ser	Ala	Leu	Gly	Val	Glu	Val	Thr	Ile	Arg	Ala	Leu
5795						5800					5805			
Phe	Glu	Thr	Leu	Thr	Pro	Gln	Arg	Leu	Ala	Ala	Arg	Leu	Thr	Arg
5810						5815					5820			
Ala	Ser	Ala	Pro	Gly	Arg	Val	Ala	Pro	Ala	Pro	Arg	Thr	Arg	Pro
5825						5830					5835			
Glu	Arg	Ile	Pro	Leu	Ser	Phe	Ala	Gln	Arg	Arg	Leu	Trp	Phe	Leu
5840						5845					5850			
Gly	Glu	Leu	Glu	Gly	Ser	Ser	Ala	Thr	Tyr	Ser	Asn	Thr	Thr	Ala
5855						5860					5865			
Leu	Arg	Leu	Ser	Gly	Glu	Leu	Asp	Pro	Ala	Ala	Leu	Thr	Ala	Ala
5870						5875					5880			
Leu	His	Asp	Val	Ile	Gly	Arg	His	Glu	Val	Leu	Arg	Thr	Val	Ile
5885						5890					5895			
Pro	Ala	Glu	Asp	Gly	Arg	Pro	Tyr	Gln	Leu	Val	Leu	Pro	Pro	Glu
5900						5905					5910			
Glu	Ala	Arg	Pro	Ala	Val	Glu	Ile	Val	Glu	Val	Ala	Pro	Gly	Glu
5915						5920					5925			
Leu	Gly	Ala	Ala	Val	Asp	Glu	Val	Ala	Gly	Tyr	Ala	Phe	Asp	Leu
5930						5935					5940			
Ala	Ala	Glu	Ile	Pro	Val	Arg	Ala	Arg	Leu	Ile	Arg	Leu	Gly	Ala
5945						5950					5955			
Thr	Asp	His	Val	Leu	Val	Leu	Val	Ile	His	His	Ile	Ala	Thr	Asp
5960						5965					5970			
Gly	Trp	Ser	Met	Ala	Pro	Leu	Ala	Arg	Asp	Leu	Ala	Ala	Ala	Tyr
5975						5980					5985			
Glu	Ala	Arg	Leu	Ala	Gly	Arg	Ala	Pro	Arg	Trp	Glu	Pro	Leu	Pro
5990						5995					6000			

Leu	Gln	Tyr	Ala	Asp	Tyr	Ala	Leu	Trp	Gln	Glu	Glu	Leu	Leu	Gly
6005						6010					6015			
Ala	Ala	Gly	Asp	Pro	Glu	Ser	Leu	Arg	Glu	Arg	Gln	Leu	Ala	Tyr
6020						6025					6030			
Trp	Arg	Asp	Thr	Leu	Ala	Gly	Met	Pro	Pro	Glu	Ile	Pro	Leu	Pro
6035						6040					6045			
Ala	Asp	Arg	Ser	Arg	Pro	Pro	Val	Ala	Ser	His	Arg	Gly	Gly	Glu
6050						6055					6060			
Val	Pro	Ile	Ala	Ile	Pro	Ala	Asp	Leu	His	Arg	Arg	Leu	Ala	Glu
6065						6070					6075			
Leu	Ala	Val	Ala	Glu	Arg	Ala	Thr	Leu	Phe	Met	Val	Leu	Gln	Ala
6080						6085					6090			
Gly	Phe	Ala	Ala	Leu	Leu	Ser	Arg	Leu	Gly	Ala	Gly	Thr	Asp	Val
6095						6100					6105			
Pro	Ile	Gly	Thr	Ala	Leu	Ala	Gly	Arg	Thr	Asp	Asp	Ala	Leu	Asp
6110						6115					6120			
Glu	Leu	Val	Gly	Phe	Phe	Val	Asn	Met	Leu	Val	Leu	Arg	Thr	Asp
6125						6130					6135			
Val	Ser	Gly	Asp	Pro	Gly	Phe	Gly	Thr	Leu	Leu	Arg	Arg	Val	Arg
6140						6145					6150			
Glu	Thr	Gly	Leu	Ala	Ala	Tyr	Ala	His	Gln	Asp	Val	Pro	Phe	Asp
6155						6160					6165			
Gln	Val	Val	Glu	Glu	Leu	Val	Thr	Glu	Arg	Ser	Leu	Ala	Arg	His
6170						6175					6180			
Pro	Leu	Phe	Gln	Val	Ala	Leu	Thr	Val	Gln	Asn	Ala	Pro	Gly	Ala
6185						6190					6195			
Arg	Pro	Arg	Leu	Ala	Gly	Leu	Glu	Val	Gly	Thr	Glu	Pro	Ile	Glu
6200						6205					6210			
His	Gly	Ile	Ala	Arg	Tyr	Asp	Leu	Thr	Leu	Thr	Val	Thr	Glu	Arg
6215						6220					6225			
Arg	Asp	Glu	His	Gly	Ala	Pro	Asp	Gly	Leu	Glu	Gly	His	Leu	Glu
6230						6235					6240			
Phe	Ser	Arg	Asp	Leu	Phe	Asp	Ala	Pro	Thr	Val	Ala	Thr	Leu	Gly
6245						6250					6255			
Asp	Arg	Leu	Ile	Arg	Leu	Leu	Thr	Ala	Ala	Val	Ala	Asp	Pro	Glu
6260						6265					6270			
Leu	Pro	Leu	Ser	Arg	Ile	Asp	Leu	Met	Ala	Pro	Ala	Glu	Arg	Arg
6275						6280					6285			
Asn	Val	Leu	Glu	Gly	Trp	Ser	Thr	Ala	Arg	Arg	Asp	Val	Pro	Ala
6290						6295					6300			
Ala	Thr	Val	Pro	Glu	Leu	Val	Ala	Ala	Gln	Val	Ala	Arg	Arg	Pro

6305	6310	6315
Gly Ala Val Ala Leu Arg Ser 6320	Glu Asp Gly Glu Ile Thr Tyr Ala 6325	
Glu Leu Asp Ala Arg Ala Gly 6335	Arg Leu Ala Ala Val Leu Arg Arg 6340	
Arg Gly Ile Gly Pro Glu Ser 6350	Arg Val Ala Val Leu Leu Pro Arg 6355	
Gly Val Glu Gln Val Val Ala 6365	Phe Leu Ala Val Val Arg Ala Gly 6370	
Gly Thr Tyr Leu Pro Ile Asp 6380	Pro Ala Tyr Pro Arg Asp Arg Val 6385	
Asp Tyr Leu Val Arg Asp Ala 6395	Glu Pro Ala Cys Leu Leu Thr Val 6400	
Ala Gly His Arg Ala Ala Ala 6410	Pro Ala Ala Pro Ala Val Val Glu 6415	
Leu Asp Asp Pro Ala Thr Ala 6425	Ala Glu Ile Ala Asp Ala Glu Pro 6430	
Glu Pro Pro Val Ala Val Arg 6440	Pro Thr His Ser Ala Tyr Leu Ile 6445	
Tyr Thr Ser Gly Ser Thr Gly 6455	Arg Pro Lys Gly Val Val Val Thr 6460	
His Arg Gly Val Ala Ala Leu 6470	Val Ala Thr Gln Ala Glu Arg Leu 6475	
Ala Val Thr Gly Glu Ser Arg 6485	Val Leu Gln Phe Ala Ser Val Gly 6490	
Phe Asp Ala Ser Ile Trp Glu 6500	Met Val Met Ala Leu Cys Ala Gly 6505	
Ala Thr Leu Val Val Ala Pro 6515	Ala Asp Asp Leu Leu Pro Gly Pro 6520	
Ala Leu Ala Ala Thr Leu Ser 6530	Gly His Ala Val Thr His Ala Thr 6535	
Leu Pro Pro Ala Val Leu Ala 6545	Ala Ser Ala Pro Gly Asp Leu Ala 6550	
Pro Leu Ala Val Leu Val Ser 6560	Ala Gly Glu Ala Leu Gly Pro Asp 6565	
Leu Val Arg Gln Phe Ala Pro 6575	Gly Arg Ala Leu Val Asn Ala Tyr 6580	
Gly Pro Thr Glu Thr Thr Val 6590	Cys Ala Thr Ala Ser Ala Pro Leu 6595	
Gly Pro Glu Asp Pro Pro His 6605	Ile Gly Ala Pro Val Ala Asp Ser 6610	

Arg Val Tyr Val Leu Asp Asp Ala Leu Thr Pro Val Pro Pro Gly
 6620 6625 6630
 Val Thr Gly Glu Leu Tyr Val Ser Gly Ala Ser Leu Ala Arg Gly
 6635 6640 6645
 Tyr Ala Gly Arg Ala Ala Leu Thr Ala Glu Arg Phe Val Ala Cys
 6650 6655 6660
 Pro Phe Ala Pro Gly Glu Arg Met Tyr Arg Thr Gly Asp Arg Ala
 6665 6670 6675
 Arg Trp Asp Ala Ala Gly Arg Leu Thr Phe Ala Gly Arg Ala Asp
 6680 6685 6690
 Asp Gln Val Lys Ile Arg Gly Phe Arg Val Glu Pro Gly Glu Val
 6695 6700 6705
 Ala Ala Val Leu Gly Glu His Pro Ala Val Ala Arg Ala Ala Val
 6710 6715 6720
 Val Ala Arg Thr Asp Gly Pro Gln Gly Ala Arg Leu Val Ala Tyr
 6725 6730 6735
 Leu Val Ala Ala Asp Pro Ala Gly Pro Asp Leu Ala Ala Ala Val
 6740 6745 6750
 Arg Ala Tyr Ala Ala Ala Thr Leu Pro Ala His Leu Leu Pro Ala
 6755 6760 6765
 Ala Phe Val Pro Leu Asp Arg Leu Pro Leu Thr Thr Asn Gly Lys
 6770 6775 6780
 Leu Asp Arg Ala Ala Leu Pro Glu Pro Glu Thr Gly Ala Gly Arg
 6785 6790 6795
 Glu Pro Ser Gly Pro Val Glu Arg Leu Leu Cys Glu Ala Phe Ala
 6800 6805 6810
 Asp Val Leu Gly Leu Asp Arg Val Gly Ala Asp Gly His Phe Phe
 6815 6820 6825
 Asp Leu Gly Gly His Ser Leu Leu Ala Thr Arg Leu Leu Ser Arg
 6830 6835 6840
 Leu Arg Ser Ala Ala Gly Ile Asp Val Pro Val Arg Val Leu Phe
 6845 6850 6855
 Glu Asn Pro Thr Pro Ala Gly Leu Ala Ala Trp Val Glu Thr His
 6860 6865 6870
 Ala Gly Ser Arg Arg Lys Ser Arg Pro Ala Leu Arg Pro Met Arg
 6875 6880 6885
 His Gln Lys Glu Ser
 6890

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 <211> 8695
 <212> PRT
 <213> Actinoplanes sp.

<400> 15

Met Ile Pro Leu Ser Phe Ala Gln Arg Arg Leu Trp Phe Leu Gly Arg
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Leu Glu Gly Pro Ser Ala Thr Tyr Asn Ile Pro Leu Val Leu Gly Leu
20 25 30
Thr Gly Thr Val Asp Ala Ala Ala Leu Glu Thr Ala Leu Arg Asp Val
35 40 45
Leu Glu Arg His Glu Val Leu Arg Thr Val Tyr Pro Asp Ala Gly Gly
50 55 60
Glu Pro His Gln Arg Ile Leu Pro Leu Gly Glu Thr Gly Phe Gly Leu
65 70 75 80
Arg Val Ala Glu Val Thr Asp Gly Glu Leu Asp Ala Ala Val Ala Asp
85 90 95
Ala Thr Gly His Ala Phe Asp Leu Ala Thr Glu Ile Pro Val Arg Ala
100 105 110
Ser Leu Leu Thr Val Glu Pro Gly Arg His Val Leu Ala Leu Val Leu
115 120 125
His His Ile Ala Ala Asp Gly Trp Ser Met Gly Pro Leu Leu Arg Asp
130 135 140
Leu Ser Thr Ala Tyr Thr Ala Arg Leu Ala Gly Gly Glu Pro Ala Trp
145 150 155 160
Ser Pro Leu Pro Val Gln Tyr Ala Asp Tyr Ala Leu Trp Gln Gln Glu
165 170 175
Val Leu Gly Ala Gly Asp Asp Pro Glu Ser Leu Leu Arg Glu Gln Val
180 185 190
Gly Tyr Trp Arg Ser Ala Leu Ala Gly Ala Pro Glu Glu Leu Arg Leu
195 200 205
Pro Ala Asp His Arg Arg Pro Pro Val Ser Ser Ser Arg Ala His Met
210 215 220
Ala Glu Phe Ala Val Pro Ala Ala Ala His Gly Asp Leu Thr Ala Leu
225 230 235 240
Thr Arg Glu Leu Gly Ala Thr Leu Phe Met Ala Val His Ala Ala Thr
245 250 255
Ala Met Val Leu Ser Gly Leu Gly Ala Gly Asp Asp Leu Pro Ile Gly
260 265 270
Thr Val Val Ala Gly Arg Thr Asp Ala Gly Leu Asp Asp Leu Val Gly
275 280 285
Cys Phe Val Asn Asn Leu Val Ile Arg Ala Asp Leu Thr Gly Asp Pro
290 295 300
Thr Phe Ala Asp Leu Leu Arg Gln Val Arg Glu Arg Ala Leu Asp Ala

305		310		315		320
Tyr Gly His Gln Asp Val Pro Phe Glu Lys Leu Val Glu Glu Leu Ala	325		330			335
Pro Ser Arg Ser Leu Ser Arg His Pro Leu Phe Gln Val Ala Val Ala	340		345			350
Val Glu Thr Asp Asp Leu Ile Gly Gly Arg Gly Gly Gly Pro Ala Leu	355		360			365
Arg Leu Pro Gly Leu Gly Ile Glu Val Leu Pro Gly Glu Pro Ser Ala	370		375			380
Arg Asp Leu Asp Leu Asp Leu Val Val Arg Glu Thr Phe Asp Ala Glu	385		390			400
Gly Arg Pro Ala Gly Leu Thr Gly Ala Leu Ile Gly Ala Ala Gly Leu	405		410			415
Phe Asp Ala Ala Ser Val Glu Arg Leu Ala Ala Leu Leu Ala Arg Ala	420		425			430
Leu Glu Ala Leu Ala Ala Asp Pro Arg Thr Arg Ala Gly Asp Leu Asp	435		440			445
Leu Leu Ser Pro Ala Asp Arg Arg Leu Ile Leu Arg Gly Trp Asn Asp	450		455			460
Thr Ala Ala Pro Ala Pro Ala Gly Leu Val Pro Asp Leu Phe Ala Ala	465		470			480
Gln Ala Ala Arg Thr Pro Asp Ala Val Ala Val Ala Gly Pro Asp Arg	485		490			495
Glu Leu Thr Tyr Ala Glu Leu Asp Glu Arg Ser Gly Arg Leu Ala Arg	500		505			510
Trp Leu Ile Arg Arg Gly Val Ala Ala Asp Thr Arg Val Ala Leu Val	515		520			525
Leu Glu Arg Ser Ala Glu Leu Pro Val Ala Ile Leu Ala Val Leu Lys	530		535			540
Ala Gly Gly Ala Tyr Leu Pro Ile Asp Pro Ala Gln Pro Pro Arg Arg	545		550			560
Ile Ala Asp Ile Val Ala Asp Ala Ala Pro Ala Leu Val Leu Ala Gln	565		570			575
Ala Ser Thr Ala Asp Val Val Ala Asp Ala Ser Pro Ala Leu Val Leu	580		585			590
Ala Pro Ala Ser Asp Gly Val Pro Thr Gly Ala Val Pro Val His Leu	595		600			605
Leu Asp Ser Pro Ala Val Arg Asp Glu Val Ala Gln Cys Pro Ala Gly	610		615			620
Ala Val Thr Asp Ala Asp Arg Arg Gly Val Leu Leu Gly Gly His Ala	625		630			640

Ala Tyr Val Ile Tyr Thr Ser Gly Ser Thr Gly Arg Pro Lys Gly Val
 645 650 655
 Val Val Ser His Asp Ala Phe Ala Asn Leu Val Leu Asp Gln Arg Arg
 660 665 670
 Leu Gly Ile Gly Pro Gly Ser Arg Val Ala Gln Phe Ala Ser Pro Gly
 675 680 685
 Phe Asp Met Phe Val Asp Glu Trp Ser Met Ala Leu Leu Ala Gly Ala
 690 695 700
 Ala Leu Val Ile Val Pro Pro Glu Arg Arg Leu Gly Ala Asp Leu Ala
 705 710 715 720
 Ala Phe Leu Thr Glu Arg Gly Val Thr His Ala Thr Leu Pro Pro Ala
 725 730 735
 Val Val Ala Thr Leu Pro Glu Glu Ser Leu Pro Arg Ser Phe Val Leu
 740 745 750
 Asp Ile Gly Gly Asp Ala Leu Pro Asp Asp Leu Ala Arg Arg Trp Leu
 755 760 765
 Arg Asp Gly Arg Trp Leu Gly Asn Ser Tyr Gly Pro Thr Glu Thr Thr
 770 775 780
 Val Asn Ala Ala Thr Trp Arg Cys Glu Pro Gly Thr Trp Glu Gly Ala
 785 790 795 800
 Thr Pro Ile Gly Arg Pro Val Ala Asn Leu Arg Ala Tyr Val Leu Asp
 805 810 815
 Gly Arg Leu Arg Pro Val Pro Val Gly Val Glu Gly Glu Leu Tyr Val
 820 825 830
 Ser Gly Ala Gly Leu Ala Arg Gly Tyr Leu Asn Arg Ala Gly Leu Thr
 835 840 845
 Ala Gly Ser Phe Val Ala Cys Pro Phe Glu Pro Gly Glu Arg Met Tyr
 850 855 860
 Arg Thr Gly Asp Ile Val Arg Trp Asp Ala Arg Gly Arg Leu Val Tyr
 865 870 875 880
 Ala Gly Arg Ala Asp Asp Gln Ala Lys Ile Arg Gly Phe Arg Val Glu
 885 890 895
 Pro Gly Glu Val Glu Ala Val Leu Ala Ala Gly Pro Gly Val Asn Gln
 900 905 910
 Val Ala Val Ile Val Arg Glu Asp Val Pro Gly Asp Lys Arg Leu Val
 915 920 925
 Ala Tyr Val Val Gly Gly Asp Val Glu Thr Leu Arg Ser Tyr Ala Gln
 930 935 940
 Gln Arg Leu Pro Gly Tyr Leu Val Pro Ser Ala Ile Val Ala Leu Ala
 945 950 955 960

Glu Leu Pro Leu Thr Pro Ser Ala Lys Val Asp Arg Arg Ala Leu Pro
 965 970 975

Val Pro Asp Tyr Gly Arg Asp Ala Gly Gly Gly Arg Ala Pro Ala Asn
 980 985 990

Ala Arg Glu Glu Val Leu Cys Arg Ala Phe Ala Glu Val Leu Gly Val
 995 1000 1005

Glu Arg Val Gly Val Glu Asp Asp Phe Phe Ala Leu Gly Gly His
 1010 1015 1020

Ser Leu Leu Val Val Ser Leu Val Glu Arg Leu Arg Arg Gln Gly
 1025 1030 1035

Ile Ser Val Pro Val Arg Ala Leu Phe Thr Thr Pro Thr Pro Ala
 1040 1045 1050

Gly Leu Ala Glu Ala Val Gly Asp Gly Ala Val Val Val Pro Pro
 1055 1060 1065

Asn Leu Ile Pro Glu Gly Ala Ala Glu Leu Thr Pro Glu Met Leu
 1070 1075 1080

Pro Leu Ala Asp Leu Thr Ala Asp Glu Leu Ala Val Val Val Asp
 1085 1090 1095

Ser Val Pro Gly Gly Ala Ala Asn Ile Ala Asp Val Tyr Pro Leu
 1100 1105 1110

Ala Pro Leu Gln Glu Gly Ile Phe Phe His His Met Met Ala Asp
 1115 1120 1125

Arg Asp Ser Ala Asp Val Tyr Val Thr Pro Thr Val Val Glu Phe
 1130 1135 1140

Asp Ser Arg Asp Arg Leu Asp Gly Phe Leu Ala Ala Leu Gln Gln
 1145 1150 1155

Val Val Asp Arg Thr Asp Val Tyr Arg Thr Ser Val Val Trp Gln
 1160 1165 1170

Gly Leu Arg Glu Pro Val Gln Val Val Trp Arg His Ala Arg Leu
 1175 1180 1185

Pro Val Asp Glu Val Val Leu Arg Asp Asp Leu Asp Pro Val Glu
 1190 1195 1200

Gln Leu Asn Ala Leu Gly Thr Ala Trp Met Asp Leu Ser Glu Ala
 1205 1210 1215

Pro Leu Val Gln Ala Val Val Ala Ala Arg Pro Gly Asp Pro Gln
 1220 1225 1230

Arg Trp Leu Ala Val Leu Arg Ile His His Leu Val Gln Asp His
 1235 1240 1245

Thr Ala Leu Asp Ile Leu Leu Glu Glu Leu Ala Ala Tyr Leu Ala
 1250 1255 1260

Gly Arg Gly Gly Asp Leu Pro Glu Pro Val Pro Phe Arg Glu Phe

1265	1270	1275
Val Ala His Thr Arg Leu Gly 1280	Val Pro Arg Glu Glu 1285	His Glu Arg 1290
Tyr Phe Ala Gly Leu Leu Gly 1295	Asp Val Thr Glu Thr 1300	Thr Ala Pro 1305
Tyr Gly Leu Leu Asp Val His 1310	Ser Gly Gly Leu Ala 1315	Ser Ala Gln 1320
Ala His Leu Arg Leu Asp Gly 1325	Pro Leu Gly Arg Arg 1330	Val Ala Ala 1335
Phe Ala Arg Glu His Gly Val 1340	Ser Pro Ala Thr Leu 1345	Phe His Leu 1350
Ala Trp Ala Arg Val Leu Gly 1355	Thr Leu Ala Gly Arg 1360	Asp Asp Val 1365
Val Phe Gly Thr Val Leu Phe 1370	Gly Arg Met Asn Ser 1375	Gly Ala Gly 1380
Ala Asp Arg Val Pro Gly Leu 1385	Phe Ile Asn Thr Leu 1390	Pro Val Arg 1395
Val Arg Leu Gly Ala Pro Val 1400	Gly Asp Ala Leu Asp 1405	Gly Leu Arg 1410
Asp Gln Leu Ile Glu Leu Ile 1415	Ala His Glu His Ala 1420	Pro Leu Ala 1425
Val Ala Gln Gln Ala Ala Asn 1430	Leu Phe Gly Arg Pro 1435	Leu Phe Thr 1440
Ser Ile Phe Asn Tyr Arg Tyr 1445	Ala Arg Gly Ala Glu 1450	Pro Ala Gly 1455
Ala Ala Leu Asp Gly Ile Arg 1460	Leu Leu Ser Ala Arg 1465	Asp Leu Thr 1470
Asn Tyr Pro Leu Ala Val Ala 1475	Val Asp Ala Glu Gly 1480	Asp Thr Phe 1485
Ser Leu Thr Val Asp Ala Val 1490	Ala Pro Ala Asp Pro 1495	Val Gln Val 1500
Gly Glu Leu Leu Val Thr Ala 1505	Leu Arg Asn Leu Thr 1510	Arg Thr Ala 1515
Glu Asn Ala Pro Gly Thr Pro 1520	Leu Ala Ala Val Gly 1525	Val Leu Gly 1530
Glu Asp Glu Leu Ser Arg Val 1535	Val Ser Gly Trp Asn 1540	Asp Thr Ala 1545
Arg Arg Val Arg Gln Ala Ser 1550	Val Pro Glu Leu Phe 1555	Ala Glu Arg 1560
Val Ala Ala Ala Pro Gly Ala 1565	Pro Ala Val Ala Ala 1570	Gly Asp Leu 1575

Arg Trp Thr Tyr Ala Asp Leu	Asp Ala Arg Ser Asp	Ala Leu Ala
1580	1585	1590
Arg Ser Leu Val Ala Ala Gly	Val Thr Ala Glu Ser	Pro Val Val
1595	1600	1605
Val Ala Leu Glu Arg Ser Ala	Asp Val Leu Thr Ala	Phe Leu Ala
1610	1615	1620
Val Ala Lys Ala Gly Gly Val	Phe Val Pro Val Asp	Leu Ser Trp
1625	1630	1635
Pro Arg Ala Arg Val Asp Ala	Val Ile Ala Asp Cys	Ala Ala Trp
1640	1645	1650
Ile Ala Val Ala Asp Arg Pro	Met Thr Gly Leu Thr	Val Val Pro
1655	1660	1665
Ala Asn Arg Ala Gly Asp Pro	Ala Val Ala Leu Pro	Pro Arg Pro
1670	1675	1680
Leu Pro Gly Ala Ala Ala Tyr	Arg Met Tyr Thr Ser	Gly Ser Thr
1685	1690	1695
Gly Arg Pro Lys Gly Val Val	Thr Thr His Gln Asn	Val Val Asp
1700	1705	1710
Leu Val Thr Asp Arg Cys Trp	Gly Pro Thr Pro Arg	Val Leu Phe
1715	1720	1725
His Ala Pro His Ala Phe Asp	Ala Ser Ser Phe Glu	Leu Trp Val
1730	1735	1740
Pro Leu Leu Thr Gly Gly Thr	Val Val Val Ala Pro	Gly Glu Ser
1745	1750	1755
Ile Asp Thr Gly Val Leu Arg	Gln Leu Ile Arg Ala	His Glu Leu
1760	1765	1770
Thr His Val His Val Thr Ala	Gly Leu Leu Arg Val	Leu Ala Glu
1775	1780	1785
Asp Pro Ser Cys Phe Ala Gly	Leu Thr Glu Val Leu	Thr Gly Gly
1790	1795	1800
Asp Val Val Pro Ala Glu Ala	Val Arg Arg Val Leu	Asp Ala Asn
1805	1810	1815
Pro Gly Val Arg Val Arg Gln	Leu Tyr Gly Pro Thr	Glu Val Thr
1820	1825	1830
Leu Cys Ala Thr Gln His Val	Val Arg Glu Pro Ser	Pro Val Leu
1835	1840	1845
Pro Ile Gly Arg Pro Leu Asp	Asn Thr Arg Val Tyr	Val Leu Asp
1850	1855	1860
Gly Leu Leu Gln Pro Val Pro	Val Gly Val Thr Gly	Glu Leu Tyr
1865	1870	1875

Ile	Ala	Gly	Ala	Gly	Val	Ala	Arg	Gly	Tyr	Ala	Asp	Met	Pro	Gly
1880						1885					1890			
Thr	Thr	Ala	Glu	Arg	Phe	Val	Ala	Asp	Pro	Phe	Thr	Ala	Gly	Gly
1895						1900					1905			
Arg	Leu	Tyr	Arg	Thr	Gly	Asp	Leu	Val	Arg	Trp	Thr	Gly	Glu	Gly
1910						1915					1920			
Glu	Leu	Val	Phe	Ala	Gly	Arg	Ala	Asp	Asp	Gln	Val	Lys	Ile	Arg
1925						1930					1935			
Gly	Tyr	Arg	Val	Glu	Pro	Gly	Glu	Val	Glu	Ala	Val	Leu	Ala	Ala
1940						1945					1950			
Leu	Pro	Gly	Val	Ser	Gln	Ala	Ala	Val	Ile	Val	Arg	Glu	Asp	Val
1955						1960					1965			
Pro	Gly	Asp	Lys	Arg	Leu	Val	Ala	Tyr	Leu	Val	Ala	Ala	Pro	Glu
1970						1975					1980			
Thr	Val	Glu	Ala	Ala	Arg	Ala	His	Ala	Glu	Gln	Arg	Leu	Pro	Ser
1985						1990					1995			
Tyr	Leu	Val	Pro	Ser	Ala	Phe	Val	Gln	Leu	Asp	Ala	Leu	Pro	Leu
2000						2005					2010			
Thr	Gly	Asn	Gln	Lys	Val	Asp	Arg	Ala	Ala	Leu	Pro	Ala	Pro	Leu
2015						2020					2025			
Gly	Phe	Glu	Ala	Gly	Ala	Gly	Arg	Ala	Pro	Ala	Asp	Ala	Arg	Glu
2030						2035					2040			
Glu	Leu	Val	Gly	Ala	Ala	Phe	Ala	Glu	Val	Leu	Asp	Leu	Gly	Arg
2045						2050					2055			
Val	Gly	Pro	Asp	Asp	Asp	Phe	Phe	Ala	Leu	Gly	Gly	His	Ser	Leu
2060						2065					2070			
Leu	Ala	Leu	Ala	Leu	Val	Glu	Arg	Leu	Arg	Arg	Gln	Gly	Leu	Gly
2075						2080					2085			
Val	Ser	Val	Arg	Ala	Val	Phe	Asp	Ala	Arg	Thr	Pro	Ala	Ala	Leu
2090						2095					2100			
Thr	Arg	Arg	Gly	Asp	Gly	Gly	Ala	Asp	Asp	Arg	Pro	Ala	Leu	Arg
2105						2110					2115			
Ala	Gly	Ala	Arg	Pro	Ala	Arg	Leu	Pro	Leu	Ser	Tyr	Ala	Gln	Arg
2120						2125					2130			
Arg	Leu	Trp	Phe	Leu	Ala	Gln	Leu	Glu	Gly	Pro	Ser	Ala	Thr	Tyr
2135						2140					2145			
Asn	Ile	Pro	Val	Ala	Leu	Arg	Leu	Glu	Gly	Asp	Leu	Asp	Arg	Asp
2150						2155					2160			
Ala	Leu	Thr	Ala	Ala	Leu	Arg	Asp	Val	Val	Ala	Arg	His	Glu	Val
2165						2170					2175			
Leu	Arg	Thr	Val	Phe	Thr	Val	Ala	Asp	Gly	Glu	Pro	Trp	Gln	His

2180	2185	2190
Ile Leu Asp Pro Ala Arg 2195	Ala Glu Pro Ala Leu 2200	Pro Val Val Asp 2205
Val Pro Ala Gly Arg Val 2210	Glu Glu Ala Val Ala 2215	Glu Ala Ala Ala 2220
Tyr Ala Phe Asp Leu Ala 2225	Arg Glu Ile Pro Leu 2230	Arg Ala Val Leu 2235
Leu Ala Pro Gly Asp Gly 2240	Thr His Val Leu Val 2245	Leu Val Leu His 2250
His Ile Ala Ala Asp Gly 2255	Trp Ser Met Arg Pro 2260	Leu Ala Arg Asp 2265
Leu Ala Thr Ala Tyr Ala 2270	Ala Arg Arg Arg Gly 2275	Gln Ala Pro Glu 2280
Ser Glu Thr Leu Pro Val 2285	Gln Tyr Ala Asp Tyr 2290	Ala Leu Trp Gln 2295
Arg Asp Leu Leu Gly Ser 2300	Asp Ser Asp Pro Ala 2305	Ser Leu Ile Ser 2310
Arg Gln Ile Ala His Trp 2315	Arg Glu Arg Leu Asp 2320	Gly Val Pro Glu 2325
Glu Leu Asp Leu Pro Ala 2330	Asp Arg Pro Arg Pro 2335	Ala Ala Ala Ser 2340
His Arg Gly His Leu His 2345	Ser Ala Glu Ile Pro 2350	Ala Asp Val His 2355
Arg Ser Leu Arg Arg Val 2360	Ala Ala Asp His Gly 2365	Ala Thr Val Phe 2370
Met Thr Leu Gln Ala Ala 2375	Val Ala Val Leu Leu 2380	Ser Arg Leu Gly 2385
Ala Gly Thr Asp Val Pro 2390	Ile Gly Thr Val Val 2395	Ala Gly Arg Ala 2400
Asp Arg Ala Leu Glu Asn 2405	Leu Val Gly Phe Phe 2410	Val Asn Thr Leu 2415
Val Leu Arg Thr Asp Leu 2420	Thr Gly Asp Pro Arg 2425	Leu Thr Asp Val 2430
Leu Gly Gln Val Arg Glu 2435	Leu Thr Leu Arg Ala 2440	Leu Ala His Gln 2445
Asp Val Pro Phe Glu Lys 2450	Leu Val Glu Glu Leu 2455	Thr Pro Ala Arg 2460
Ser Leu Ala Arg His Pro 2465	Leu Phe Gln Val Met 2470	Val Thr Leu Asp 2475
Gly Gly Gly Pro Asp Gly 2480	Ala Glu Leu Pro Gly 2485	Leu Ala Met Ser 2490

Val	Val	Pro	Thr	Gly	Ala	Val	Pro	Ala	Lys	Phe	Asp	Leu	Asp	Leu
2495						2500					2505			
Thr	Phe	Thr	Glu	Thr	Phe	Asp	Ala	Ala	Gly	Glu	Pro	Ala	Gly	Leu
2510						2515					2520			
Arg	Val	Asp	Leu	Ile	Ala	Ala	Ala	Asp	Leu	Phe	Asp	Ala	Gly	Thr
2525						2530					2535			
Ala	Ala	Arg	Leu	Ala	Gly	Tyr	Leu	Ser	Arg	Val	Leu	Gly	Val	Leu
2540						2545					2550			
Ala	Ala	Asp	Pro	Arg	Arg	Arg	Leu	Ala	Glu	Val	Asp	Pro	Leu	Glu
2555						2560					2565			
Ala	Glu	Glu	Ser	Arg	Leu	Met	Leu	Ala	Ala	Gly	Glu	Glu	Pro	Ala
2570						2575					2580			
Pro	Ala	Leu	Pro	Glu	Ile	Thr	Val	Ala	Ala	Leu	Val	Ala	Glu	Gln
2585						2590					2595			
Cys	Ala	Arg	Thr	Pro	Gly	Ala	Val	Ala	Val	Thr	Gly	Pro	Asp	Ala
2600						2605					2610			
Ser	Leu	Thr	Tyr	Ala	Glu	Leu	Asp	Glu	Arg	Ala	Ala	Arg	Ile	Ala
2615						2620					2625			
Arg	Trp	Leu	Arg	Arg	His	Gly	Ala	Gly	Pro	Gly	Ala	Ala	Val	Cys
2630						2635					2640			
Val	Leu	Met	Glu	Arg	Ser	Ala	Glu	Leu	Val	Ala	Val	Leu	Leu	Gly
2645						2650					2655			
Val	Met	Arg	Ala	Gly	Ala	Ala	Tyr	Val	Pro	Val	Asp	Pro	Ala	Tyr
2660						2665					2670			
Pro	Ala	Glu	Arg	Ile	Arg	Phe	Val	Val	Thr	Asp	Ala	Arg	Ala	Ala
2675						2680					2685			
Cys	Val	Val	Ser	Glu	Ser	Ala	Ser	Ala	Gly	Leu	Val	Pro	Asp	Gly
2690						2695					2700			
Val	Pro	Cys	Leu	Ala	Ile	Asp	Asp	Pro	Ala	Ala	Ala	Ala	Glu	Pro
2705						2710					2715			
Ala	Glu	Pro	Gly	Asp	Asp	Pro	Gly	Asp	Ala	Ala	Gly	Pro	Arg	Pro
2720						2725					2730			
Asp	Asp	Pro	Ala	Tyr	Ile	Ile	Tyr	Thr	Ser	Gly	Ser	Thr	Gly	Thr
2735						2740					2745			
Pro	Lys	Gly	Val	Val	Val	Ser	His	Arg	Asn	Val	Val	Ala	Leu	Leu
2750						2755					2760			
Thr	Ala	Thr	Arg	Pro	Leu	Phe	Gly	Phe	Ala	Gly	Asp	Glu	Val	Trp
2765						2770					2775			
Ser	Trp	Phe	His	Ser	Val	Ala	Phe	Asp	Phe	Ser	Val	Trp	Glu	Leu
2780						2785					2790			

Trp Gly 2795	Ala Leu Thr His	Gly 2800	Gly Arg Val Val Val	Val Val Pro Tyr 2805
Ala Val 2810	Ser Arg Ser Pro	Arg 2815	Asp Phe Trp Glu Leu	Val Val Arg 2820
Glu Gly 2825	Val Thr Val Leu	Ser 2830	Gln Thr Pro Ser	Ala Phe Ala Gln 2835
Leu Met 2840	Ala Ala Ala Gly	Asp 2845	Asp Asp Arg Asp	Ala Leu Arg Phe 2850
Val Val 2855	Phe Gly Gly Glu	Ala 2860	Leu Asp Pro Gly	Arg Leu Ala Gly 2865
Trp Leu 2870	Ala Arg Arg Pro	Asp 2875	Lys Pro Arg Leu	Val Asn Met Tyr 2880
Gly Ile 2885	Thr Glu Thr Thr	Val 2890	His Thr Thr Tyr	Gln His Ile Ala 2895
Pro Gly 2900	Thr Thr Gly Ser	Val 2905	Ile Gly Arg Gly	Leu Pro Gly Phe 2910
Gly Leu 2915	Tyr Val Leu Asp	Glu 2920	Ala Leu Arg Pro	Val Pro Ala Gly 2925
Val Pro 2930	Gly Glu Val Tyr	Ala 2935	Arg Gly Pro Gln	Val Ala Arg Gly 2940
Tyr Ile 2945	Gly Arg Pro Gly	Leu 2950	Thr Ala Glu Arg	Phe Val Ala Ser 2955
Pro Phe 2960	Ala Pro Gly Glu	Arg 2965	Met Tyr Arg Thr	Gly Asp Val Ala 2970
Arg Trp 2975	Thr Ala Asp Gly	Arg 2980	Leu Val Phe Ala	Gly Arg Ser Asp 2985
Asp Gln 2990	Ile Lys Ile Arg	Gly 2995	Phe Arg Ile Glu	Pro Gly Glu Val 3000
Glu Ala 3005	Val Leu Ala Ala	Gly 3010	Pro Gly Val Ser	Gln Ala Ala Val 3015
Ile Val 3020	Arg Glu Asp Val	Pro 3025	Gly Asp Lys Arg	Leu Val Ala Tyr 3030
Val Val 3035	Gly Gly Asp Ala	Glu 3040	Thr Leu Arg Ser	His Ala Gln Gln 3045
Arg Leu 3050	Pro Gly Tyr Leu	Val 3055	Pro Ser Ala Phe	Val Glu Leu Asp 3060
Arg Leu 3065	Pro Leu Thr Val	Asn 3070	Gly Lys Leu Asp	Arg Arg Ala Leu 3075
Pro Val 3080	Pro Asp Tyr Gly	Arg 3085	Asp Ala Gly Gly	Gly Arg Ala Pro 3090
Ala Asn	Ala Arg Glu Glu	Val	Leu Cys Arg Ala	Phe Ala Glu Val

3095					3100					3105				
Leu	Gly	Val	Glu	Arg	Val	Gly	Val	Glu	Asp	Asp	Phe	Phe	Ala	Leu
3110					3115					3120				
Gly	Gly	His	Ser	Leu	Leu	Val	Val	Ser	Leu	Val	Glu	Arg	Leu	Arg
3125					3130					3135				
Arg	Gln	Gly	Ile	Ser	Val	Pro	Val	Arg	Ala	Leu	Phe	Thr	Thr	Pro
3140					3145					3150				
Thr	Pro	Ala	Gly	Leu	Ala	Glu	Ala	Val	Gly	Asp	Gly	Ala	Val	Val
3155					3160					3165				
Val	Pro	Pro	Asn	Leu	Ile	Pro	Glu	Asp	Ala	Ala	Glu	Leu	Thr	Pro
3170					3175					3180				
Glu	Met	Leu	Pro	Leu	Ala	Asp	Leu	Thr	Ala	Asp	Glu	Leu	Ala	Val
3185					3190					3195				
Val	Val	Ala	Ser	Val	Pro	Gly	Gly	Ala	Ala	Asn	Ile	Ala	Asp	Val
3200					3205					3210				
Tyr	Pro	Leu	Ala	Pro	Leu	Gln	Glu	Gly	Ile	Phe	Phe	His	His	Met
3215					3220					3225				
Met	Ala	Asp	Arg	Asp	Ser	Ala	Asp	Val	Tyr	Val	Thr	Pro	Thr	Val
3230					3235					3240				
Val	Glu	Phe	Asp	Ser	Arg	Asp	Arg	Leu	Asp	Gly	Phe	Leu	Ala	Ala
3245					3250					3255				
Leu	Gln	Gln	Val	Val	Asp	Arg	Thr	Asp	Val	Tyr	Arg	Thr	Ser	Val
3260					3265					3270				
Val	Trp	Gln	Gly	Leu	Arg	Glu	Pro	Val	Gln	Val	Val	Trp	Arg	His
3275					3280					3285				
Ala	Arg	Leu	Pro	Ile	Asp	Glu	Val	Glu	Leu	His	Glu	Gly	Thr	Asp
3290					3295					3300				
Pro	Ala	Glu	Gln	Leu	Ile	Ala	Leu	Ala	Thr	Glu	Arg	Val	Asp	Leu
3305					3310					3315				
Asp	Arg	Ala	Pro	Leu	Ile	Arg	Thr	Thr	Thr	Ala	Ala	Val	Pro	Gly
3320					3325					3330				
Ser	Gly	Arg	Trp	Leu	Ala	Leu	Leu	Arg	Ile	His	His	Leu	Val	Gln
3335					3340					3345				
Asp	His	Thr	Thr	Leu	Asp	Val	Leu	Leu	Gly	Glu	Leu	Arg	Ala	Phe
3350					3355					3360				
Leu	Glu	Gly	Arg	Gly	Asp	Glu	Leu	Pro	Glu	Pro	Val	Pro	Phe	Arg
3365					3370					3375				
Glu	Phe	Val	Ala	Gln	Ala	Arg	Leu	Gly	Val	Pro	Arg	Glu	Glu	His
3380					3385					3390				
Glu	Arg	Tyr	Phe	Ala	Glu	Leu	Leu	Gly	Asp	Val	Thr	Glu	Thr	Thr
3395					3400					3405				

Ala Pro Tyr Gly Leu Thr Glu Val His Gly Asp Gly Ser Ala Ala	3410	3415	3420
Val His Ser Arg Arg Glu Val Asp Asp Asp Leu Ala Ala Arg Leu	3425	3430	3435
His Arg Leu Ala Arg Ser Leu Gly Val Ser Pro Ala Ala Leu Phe	3440	3445	3450
His Leu Ala Trp Ala Arg Val Leu Gly Ala Val Ser Gly Arg Asp	3455	3460	3465
Asp Val Val Phe Gly Thr Val Leu Phe Gly Arg Met Asn Ser Gly	3470	3475	3480
Ala Ala Ala Asp Arg Val Gln Gly Leu Phe Ile Asn Thr Leu Pro	3485	3490	3495
Val Arg Val Arg Leu Ala Ala Gly Ser Thr Arg Asp Ala Leu Thr	3500	3505	3510
Gly Leu Arg Asp Gln Leu Ala Gly Leu Leu Val His Glu His Ala	3515	3520	3525
Pro Leu Ala Leu Ala Gln Arg Ala Ala Gly Ile Thr Asp Gly Ser	3530	3535	3540
Pro Leu Phe Ala Ser Ile Phe Asn Tyr Arg His Asn Gln Asp Asp	3545	3550	3555
Pro Ala Ala Ser Ala Gly Leu Glu Gly Ile Arg Thr Val Tyr Ser	3560	3565	3570
Ala Glu His Thr Asn Tyr Pro Leu Asp Ala Ser Ile Asp Val Thr	3575	3580	3585
Gly Asp Arg Phe Ala Ile Thr Val Asn Ala Val Ala Pro Ala Asp	3590	3595	3600
Ala Ala Arg Ile Ala Glu Leu Met His Thr Cys Leu Gly His Leu	3605	3610	3615
Ala Asp Val Leu Glu Asp Ala Pro Glu Thr Pro Leu Ser Trp Val	3620	3625	3630
Ser Pro Leu Ser Ala Glu Asp Leu Gly Arg Ile Val Gly Asp Trp	3635	3640	3645
Asn Glu Thr Arg Arg Ala Val Thr Arg Ala Ser Val Pro Glu Leu	3650	3655	3660
Phe Ala Lys Gln Val Ala Ala Thr Pro Asp Ala Ile Ala Val Ala	3665	3670	3675
Gly Glu Gly Val Ser Trp Ser Tyr Arg Glu Leu Asp Val Arg Ser	3680	3685	3690
Asp Ala Leu Ala Arg Ser Leu Val Ala Ala Gly Val Gly Ile Glu	3695	3700	3705

Ser	Pro	Val	Val	Val	Ala	Leu	Asp	Arg	Ser	Pro	Glu	Val	Pro	Thr
3710						3715					3720			
Ala	Phe	Leu	Ala	Val	Ala	Lys	Ala	Gly	Gly	Val	Phe	Val	Pro	Val
3725						3730					3735			
Asp	Leu	Ser	Trp	Pro	Gln	Ala	Arg	Val	Asp	Ala	Val	Ile	Ala	Asp
3740						3745					3750			
Cys	Ala	Ala	Arg	Val	Ala	Val	Ala	Asp	Arg	Pro	Met	Thr	Gly	Leu
3755						3760					3765			
Thr	Val	Val	Pro	Ala	Asp	Ala	Ala	Gly	Asp	Pro	Ala	Ala	Glu	Leu
3770						3775					3780			
Pro	Pro	Arg	Pro	Leu	Pro	Gly	Ala	Glu	Val	Tyr	Arg	Met	Tyr	Thr
3785						3790					3795			
Ser	Gly	Ser	Thr	Gly	Arg	Pro	Lys	Gly	Val	Val	Thr	Thr	His	Gln
3800						3805					3810			
Asn	Leu	Val	Asp	Leu	Ala	Thr	Asp	Thr	Cys	Trp	Gly	Pro	Thr	Pro
3815						3820					3825			
Arg	Val	Leu	Phe	His	Ala	Pro	His	Ala	Phe	Asp	Ala	Ser	Ser	Tyr
3830						3835					3840			
Glu	Ile	Trp	Val	Pro	Leu	Leu	Asn	Gly	Gly	Thr	Val	Val	Val	Ala
3845						3850					3855			
Pro	Gly	Arg	Ser	Ile	Asp	Ala	Ala	Val	Leu	Gly	Glu	Leu	Ile	Arg
3860						3865					3870			
Ala	His	Glu	Leu	Thr	His	Val	His	Val	Thr	Ala	Gly	Leu	Leu	Arg
3875						3880					3885			
Val	Leu	Asp	Pro	Ser	Cys	Phe	Ala	Gly	Leu	Thr	Glu	Val	Leu	Thr
3890						3895					3900			
Gly	Gly	Asp	Ala	Val	Ser	Ala	Glu	Ala	Val	Arg	Arg	Val	Met	Glu
3905						3910					3915			
Ala	Asn	Pro	Gly	Leu	Arg	Val	Arg	Gln	Leu	Tyr	Gly	Pro	Thr	Glu
3920						3925					3930			
Val	Thr	Leu	Cys	Ala	Thr	Gln	Gln	Val	Leu	Asp	Gly	Thr	Gly	Val
3935						3940					3945			
Pro	Ile	Gly	Arg	Pro	Leu	Asp	Asn	Thr	Arg	Val	Tyr	Val	Leu	Asp
3950						3955					3960			
Asp	Leu	Leu	Gln	Pro	Val	Pro	Val	Gly	Val	Thr	Gly	Glu	Leu	Tyr
3965						3970					3975			
Val	Ala	Gly	Ala	Gly	Leu	Ala	Arg	Gly	Tyr	Ala	Gly	Met	Pro	Gly
3980						3985					3990			
Leu	Thr	Ala	Glu	Arg	Phe	Val	Ala	Asp	Pro	Phe	Ser	Ser	Gly	Gly
3995						4000					4005			
Arg	Leu	Tyr	Arg	Thr	Gly	Asp	Leu	Val	Arg	Trp	Thr	Asp	Asp	Gly

4010	4015	4020
Val Leu Val Phe Ala Gly Arg 4025	Ala Asp Asp Gln Val 4030	Lys Ile Arg 4035
Gly Tyr Arg Val Glu Pro 4040	Gly Glu Val Glu Ala Val 4045	Leu Ala Ala 4050
His Pro Asp Val Ala Gln 4055	Val Ala Val Val Val 4060	Arg Glu Asp Thr 4065
Pro Gly Asp Lys Arg Leu 4070	Val Ala Tyr Val Val 4075	Gly Gly Asp Val 4080
Glu Ala Tyr Ala Gln Glu 4085	Arg Leu Pro Gly Tyr 4090	Leu Val Pro Ser 4095
Ala Phe Val His Leu Asp 4100	Ala Leu Pro Leu Thr 4105	Ser Asn Gln Lys 4110
Val Asp Arg Ala Ala Leu 4115	Pro Ala Pro Ser Val 4120	Glu Ser Gly Ala 4125
Gly Arg Ala Pro Ala Asp 4130	Ala Arg Glu Glu Leu 4135	Met Cys Ala Ala 4140
Phe Ala Glu Val Leu Asp 4145	Leu Asp Arg Val Gly 4150	Val Asp Asp Asp 4155
Phe Phe Ala Leu Gly Gly 4160	His Ser Leu Leu Val 4165	Val Arg Leu Val 4170
Gly Arg Ile Arg Gln Val 4175	Phe Gly Val Glu Val 4180	Ser Ala Arg Leu 4185
Val Phe Asp Ala Arg Thr 4190	Pro Ala Gly Val Val 4195	Ala Arg Leu Ser 4200
Glu Gly Gly Thr Ala Arg 4205	Glu Ala Val Arg Ala 4210	Arg Val Arg Pro 4215
Ala Arg Val Pro Leu Ser 4220	Phe Ala Gln Arg Arg 4225	Leu Trp Phe Leu 4230
Ser Gln Leu Asp Gly Thr 4235	Ser Thr Thr Tyr Asn 4240	Ile Pro Val Ala 4245
Leu Gln Leu Asp Gly Pro 4250	Leu Asp Arg Asp Ala 4255	Phe Thr Ala Ala 4260
Leu His Asp Val Val Ala 4265	Arg His Glu Val Leu 4270	Arg Thr Val Phe 4275
Thr Val Ala Asp Gly Glu 4280	Pro Trp Gln His Ile 4285	Leu Asp Thr Pro 4290
Ser Val Ser Val Pro Val 4295	Ile Glu Val Pro Ala 4300	Asp Gly Leu Pro 4305
Glu Ala Val Ala Ala Ala 4310	Ala Ala His Thr Phe 4315	Asp Leu Ser Arg 4320

Glu Ile	Pro Leu Arg Ala Val	Leu Leu Ala Thr Gly	Ala Asp Arg
4325	4330	4335	
His Val	Leu Val Leu Val Val	His His Ile Ala Ala	Asp Gly Trp
4340	4345	4350	
Ser Met	Gln Pro Leu Ala Arg	Asp Leu Ala Val Ala	Tyr Ala Ala
4355	4360	4365	
Arg Ile	Arg Gly Glu Ala Pro	Ala Trp Thr Ala Leu	Pro Val Gln
4370	4375	4380	
Tyr Ala	Asp Tyr Ala Leu Trp	Gln Arg Asp Val Leu	Gly Ser Glu
4385	4390	4395	
His Asp	Pro Asp Ser Ala Ile	Ser Gln Gln Val Ala	His Trp Arg
4400	4405	4410	
Arg Gln	Leu Ala Gly Ala Pro	Asp Glu Leu Pro Leu	Pro Ala Asp
4415	4420	4425	
His Pro	Arg Pro Ala Glu Ala	Thr Tyr Arg Gly His	Thr Val Glu
4430	4435	4440	
Phe Thr	Val Pro Pro Ala Val	His His Gln Leu Ala	Glu Leu Ala
4445	4450	4455	
Arg Arg	Asn Gly Val Thr Val	Phe Met Thr Val Gln	Thr Ala Leu
4460	4465	4470	
Ala Val	Leu Leu Ser Lys Leu	Gly Ala Gly Thr Asp	Ile Pro Ile
4475	4480	4485	
Gly Val	Ala Val Ala Gly Arg	Thr Asp Pro Thr Leu	Asp Asn Leu
4490	4495	4500	
Ile Gly	Phe Phe Val Asn Thr	Leu Val Leu Arg Thr	Asp Leu Thr
4505	4510	4515	
Gly Asn	Pro Thr Ile Thr Asp	Leu Leu His Arg Thr	Arg Asp Thr
4520	4525	4530	
Thr Leu	His Ala Phe Thr His	Gln Asp Val Pro Phe	Glu Lys Leu
4535	4540	4545	
Val Glu	Asp Leu Ala Pro Thr	Arg Ser Leu Ala Arg	His Pro Leu
4550	4555	4560	
Phe Gln	Val Met Met Thr Leu	Gln Ser Thr Gly Arg	Ala Gly Glu
4565	4570	4575	
Ala Ala	Glu Leu Pro Gly Leu	Glu Thr Ala Val Leu	Ser Pro Gly
4580	4585	4590	
Gly Val	Ala Ala Lys Val Asp	Leu Asp Leu Ser Leu	Ser Glu Ala
4595	4600	4605	
Tyr Asp	Asp Asp Gly Arg Pro	Ala Gly Leu Ala Gly	Thr Leu Val
4610	4615	4620	

Ala	Ala	Ala	Asp	Leu	Phe	Glu	His	Gly	Thr	Ala	Glu	Arg	Ile	Ala
4625						4630					4635			
Gly	Tyr	Leu	Ala	Arg	Leu	Leu	Ala	Val	Leu	Pro	Ala	Asp	Pro	Gly
4640						4645					4650			
Ala	Arg	Leu	Gly	Asp	Val	Asp	Leu	Leu	Asp	Gly	Glu	Glu	Arg	Arg
4655						4660					4665			
Leu	Val	Leu	Thr	Gly	Trp	Asn	Asp	Thr	Thr	Ala	Ala	Val	Pro	Ala
4670						4675					4680			
Val	Ala	Val	Pro	Glu	Leu	Ile	Glu	Arg	Arg	Ala	Ala	Ala	Glu	Pro
4685						4690					4695			
Glu	Ala	Gly	Ala	Val	Trp	Cys	Gly	Asp	Thr	His	Leu	Arg	Tyr	Gly
4700						4705					4710			
Glu	Leu	Asn	Ala	Arg	Ala	Asn	Arg	Leu	Ala	Arg	Leu	Leu	Val	Glu
4715						4720					4725			
Arg	Gly	Ala	Gly	Pro	Glu	Ser	Ile	Val	Ala	Val	Cys	Leu	Glu	Arg
4730						4735					4740			
Ser	Ala	Asp	Leu	Val	Val	Thr	Leu	Leu	Ala	Val	Leu	Lys	Thr	Gly
4745						4750					4755			
Ala	Ala	Tyr	Leu	Pro	Ile	Asp	Pro	Gly	Tyr	Pro	Ala	Gly	Arg	Ile
4760						4765					4770			
Ala	Tyr	Met	Leu	Ala	Asp	Ala	Arg	Pro	Ala	Leu	Leu	Val	Thr	Ser
4775						4780					4785			
Pro	Ala	Val	Ala	Ser	Gly	Asp	Ser	Leu	Pro	Asp	Gly	Gly	Ala	Gln
4790						4795					4800			
Arg	Ile	Val	Leu	Gly	Asp	Pro	Asp	Thr	Ala	Ala	Ala	Leu	Asp	Gly
4805						4810					4815			
Leu	Ala	Gly	Thr	Asp	Leu	Leu	Val	Ser	Glu	Arg	Arg	Gly	Val	Thr
4820						4825					4830			
His	Pro	Ala	His	Pro	Ala	Tyr	Val	Ile	Tyr	Thr	Ser	Gly	Ser	Thr
4835						4840					4845			
Gly	Arg	Pro	Lys	Gly	Val	Val	Val	Pro	His	Gly	Ala	Leu	Thr	Asn
4850						4855					4860			
Phe	Val	Ala	Ala	Met	Ser	Asp	Arg	Leu	Ala	Leu	Gly	Ala	Gly	Asp
4865						4870					4875			
Arg	Leu	Leu	Ala	Val	Thr	Thr	Val	Ala	Phe	Asp	Ile	His	Val	Leu
4880						4885					4890			
Glu	Leu	Tyr	Val	Pro	Leu	Val	Gly	Gly	Ala	Gly	Val	Val	Val	Ala
4895						4900					4905			
Glu	Asp	Ala	Val	Val	Arg	Asp	Pro	Ala	Ala	Val	Ala	Ala	Leu	Leu
4910						4915					4920			
Asp	Arg	His	Ala	Val	Thr	Ile	Val	Gln	Ala	Thr	Pro	Ala	Leu	Trp

4925		4930		4935
Gln Ala Leu Leu Ala Gly His	Ala Asp Ala Val Arg	Asp Val Arg		
4940	4945	4950		
Leu Leu Val Gly Gly Glu Ala	Leu Pro Pro Ala Leu	Ala Gly Arg		
4955	4960	4965		
Met Ala Ala Ala Gly Arg Gly	Val Thr Asn Leu Tyr	Gly Pro Thr		
4970	4975	4980		
Glu Val Thr Val Trp Ala Thr	Val Ala Asp Leu Gly	Ala Ser Pro		
4985	4990	4995		
Ala Gly Pro Val Pro Ile Gly	Thr Pro Leu Arg Asn	Thr Arg Ala		
5000	5005	5010		
Phe Val Leu Asp Asp Ala Leu	Arg Pro Val Pro Pro	Gly Val Pro		
5015	5020	5025		
Gly Glu Leu Tyr Leu Ala Gly	Asp Gln Leu Ala Arg	Gly Tyr His		
5030	5035	5040		
Gly Arg Ala Gly Leu Thr Ala	Glu Arg Phe Val Ala	Asp Pro Phe		
5045	5050	5055		
Gly Arg Gly Glu Arg Met Tyr	Arg Thr Gly Asp Arg	Val Arg Trp		
5060	5065	5070		
Thr Arg Gly Gly Ser Leu Glu	Phe Leu Gly Arg Val	Asp Asp Gln		
5075	5080	5085		
Val Lys Ile Arg Gly Phe Arg	Ile Glu Leu Gly Glu	Val Glu Ala		
5090	5095	5100		
Ala Leu Ala Ala Phe Gly Pro	Val Ala Arg Ala Ala	Ala Ala Val		
5105	5110	5115		
Arg Glu Asp Val Pro Gly Asp	Arg Arg Leu Val Gly	Tyr Val Val		
5120	5125	5130		
Pro Ala Ala Gly Glu Pro Glu	Pro Asp Pro Ala Ala	Val Arg Ala		
5135	5140	5145		
His Val Ala Ala Gln Leu Pro	Ala Tyr Met Val Pro	Ser Ala Val		
5150	5155	5160		
Val Val Leu Pro Asp Leu Pro	Leu Thr Ala Asn Gly	Lys Leu Asp		
5165	5170	5175		
Arg Lys Ala Leu Pro Ala Pro	Asp Tyr Gly Ala Ala	Ser Ala Gly		
5180	5185	5190		
Arg Ala Pro Ala Asp Glu Arg	Glu Ala Leu Ile Cys	Ala Val Phe		
5195	5200	5205		
Ala Glu Thr Leu Gly Val Thr	Asp Val Ala Ala Asp	Ala Asp Phe		
5210	5215	5220		
Phe Ala Leu Gly Gly His Ser	Leu Leu Ala Val Ser	Leu Val Glu		
5225	5230	5235		

Arg	Leu	Arg	Glu	His	Gly	Ile	Ala	Val	Pro	Val	Arg	Ala	Leu	Phe
5240						5245					5250			
Gln	Ser	Gly	Thr	Pro	Glu	Gly	Leu	Ala	Ala	Ala	Ala	Arg	Ala	Glu
5255						5260					5265			
Gly	Pro	Asp	Glu	Pro	Ala	Val	Pro	Ala	Asn	Gly	Ile	Pro	Asp	Gly
5270						5275					5280			
Ala	Thr	Ala	Leu	Thr	Pro	Ala	Met	Leu	Thr	Leu	Val	Asp	Leu	Asp
5285						5290					5295			
Ala	Glu	Glu	Ile	Ala	Arg	Val	Val	Ala	Ala	Val	Pro	Gly	Gly	Ala
5300						5305					5310			
Ala	Asn	Val	Ala	Asp	Val	Tyr	Pro	Leu	Ala	Pro	Leu	Gln	Glu	Gly
5315						5320					5325			
Leu	Leu	Phe	His	Ser	Leu	Met	Asp	Gly	Gly	Asp	Asp	Val	Tyr	Val
5330						5335					5340			
Leu	Pro	Ala	Val	Leu	Gly	Phe	Asp	Ser	Arg	Ser	Arg	Leu	Asp	Ala
5345						5350					5355			
Phe	Leu	Ala	Ala	Leu	Gln	His	Val	Ile	Asp	Arg	His	Asp	Thr	Tyr
5360						5365					5370			
Arg	Thr	Ala	Val	Val	His	Asp	Gly	Leu	Arg	Glu	Pro	Val	Gln	Val
5375						5380					5385			
Val	Trp	Arg	Arg	Ala	Thr	Leu	Pro	Val	Glu	Glu	Val	Thr	Leu	Thr
5390						5395					5400			
Ala	Gly	Ala	Asp	Pro	Val	Gln	Glu	Leu	Leu	Ala	Thr	Ala	Pro	Val
5405						5410					5415			
Glu	Phe	Ala	Leu	Asp	Arg	Ala	Pro	Leu	Leu	Arg	Val	Arg	Cys	Ala
5420						5425					5430			
Ala	Arg	Pro	Asp	Gly	Gly	Gly	Trp	Leu	Ala	Leu	Leu	Gln	Ile	His
5435						5440					5445			
His	Leu	Val	Gln	Asp	His	Ala	Thr	Leu	Asp	Ala	Met	Leu	Ala	Glu
5450						5455					5460			
Ile	Gln	Ala	Phe	Leu	Ala	Gly	Arg	Gly	Gly	Glu	Leu	Ala	Ala	Pro
5465						5470					5475			
Glu	Pro	Phe	Arg	Gly	Tyr	Val	Ala	Arg	Ala	Arg	Leu	Ala	Gly	Ala
5480						5485					5490			
Pro	Ala	Glu	His	Arg	Ala	Tyr	Phe	Ser	Arg	Leu	Leu	Gly	Asp	Val
5495						5500					5505			
Thr	Glu	Ser	Thr	Ala	Pro	Tyr	Gly	Leu	Thr	Asp	Ala	Arg	Asp	Ala
5510						5515					5520			
Arg	Pro	Thr	Gly	Lys	Ala	His	Arg	Glu	Val	Asp	Arg	Arg	Leu	Ala
5525						5530					5535			

Ala Arg Val Arg Ala Thr	Ala Ser Glu Leu Gly Val	Ser Pro Ala
5540	5545	5550
Thr Val Phe His Leu Ala Trp	Ala Arg Val Leu Gly	Thr Leu Ala
5555	5560	5565
Gly Arg Asp Asp Val Val Phe	Gly Thr Val Leu Leu	Gly Arg Leu
5570	5575	5580
Gly Ala Gly Ala Arg Ser Gly	Arg Ala Leu Gly Pro	Phe Ile Asn
5585	5590	5595
Thr Leu Pro Val Arg Val Arg	Leu Ala Ala Ala Gly	Ser Arg Glu
5600	5605	5610
Thr Leu Ala Gly Leu Arg Ala	Gln Leu Ala Glu Leu	Ile Gly His
5615	5620	5625
Glu His Ala Pro Leu Thr Leu	Ala Gln Ala Ala Ser	Gly Val Pro
5630	5635	5640
Gly Gly Thr Pro Leu Phe Thr	Ser Ile Leu Asn Tyr	Arg Gln Gly
5645	5650	5655
Pro Pro Ala Gly Asp Asp Thr	Gly Asp Glu Glu Ile	Glu Gly Ile
5660	5665	5670
Glu Leu Leu Ser Thr Glu Glu	Arg Ser Asn Tyr Pro	Val Ala Val
5675	5680	5685
Ser Val Asp Asp Asp Gly Ser	Gly Phe Arg Leu Thr	Val Asp Ala
5690	5695	5700
Ala Gln Pro Ala Ala Pro Asp	Arg Val Ala Glu Leu	Leu His Thr
5705	5710	5715
Cys Leu His Arg Leu Thr Asp	Ala Leu Ala Gly Thr	Pro Asp Val
5720	5725	5730
Glu Pro Ala Arg Ile Asp Val	Leu Gly Glu Ala Glu	Arg Arg Glu
5735	5740	5745
Val Leu Arg Thr Pro Asn Ala	Thr Ala Arg Asp Val	Ala Ala Ala
5750	5755	5760
Thr Leu Pro Ala Ile Val Gly	Glu Trp Ala Arg Thr	Thr Pro Gly
5765	5770	5775
Ala Thr Ala Val Thr Ala Glu	Asn Asp Arg Leu Thr	Tyr Ala Glu
5780	5785	5790
Leu Asp Ala Arg Ala Asn Arg	Leu Ala Arg Ser Leu	Ile Ala Arg
5795	5800	5805
Gly Val Gly Pro Gly Ala Val	Val Gly Met Leu Leu	Pro Arg Ser
5810	5815	5820
Pro Gly Leu Val Val Ala Met	Leu Ala Ile Val Lys	Ala Gly Gly
5825	5830	5835
Ala Tyr Leu Pro Leu Asp Pro	Gly Tyr Pro Ala Pro	Arg Leu Ala

5840	5845	5850
Arg Met Val Glu Asp Ala 5855	Ala Pro Ala Leu Leu 5860	Leu Ala Thr Ala 5865
Gly Thr Ala Asp Ala Val 5870	Pro Ala Gly Pro Gln 5875	Arg Leu Leu Leu 5880
Asp Asp Pro Gly Thr Ala 5885	Ala Glu Leu Ala Arg 5890	Leu Asp Gly Asp 5895
Pro Ile Arg Asp Glu Glu 5900	Arg Thr His Pro Leu 5905	Arg Pro Gly His 5910
Pro Ala Tyr Leu Met Phe 5915	Thr Ser Gly Ser Thr 5920	Gly Arg Pro Lys 5925
Gly Val Leu Val Pro His 5930	Ala Gly Ile Asp Arg 5935	Met Val Arg Arg 5940
Ser Thr Cys Leu Gln Leu 5945	Ala Pro Asp Asp Val 5950	Leu Pro His Leu 5955
Ser Ser Val Ser Phe Asp 5960	Ala Ala Thr Phe Glu 5965	Ile Trp Gly Ala 5970
Leu Leu Asn Gly Ala Thr 5975	Leu Ala Val Ala Pro 5980	Ala Glu Thr Leu 5985
Ser Val Ala Glu Leu Arg 5990	Ala Phe Leu Ala Asp 5995	Arg Gly Ala Thr 6000
Lys Leu Phe Leu Thr Thr 6005	Gly Leu Leu His Glu 6010	Val Ile Asp Ala 6015
Asp Val Thr Ala Leu Ala 6020	Gly Leu Lys Ala Val 6025	Tyr Thr Gly Gly 6030
Asp Val Leu Ser Pro Ala 6035	His Cys Arg Ser Leu 6040	Leu Asp Arg Val 6045
Pro Gly Leu Glu Leu Tyr 6050	Asn Ala Tyr Gly Pro 6055	Thr Glu Asn Thr 6060
Thr Ile Thr Thr Leu His 6065	Arg Val Arg Pro Glu 6070	Asp Leu Asp Ala 6075
Gly Thr Gly Val Pro Ile 6080	Gly Val Pro Ile Ser 6085	Asp Thr Arg Val 6090
Tyr Val Leu Asp Asp Ala 6095	Leu Arg Pro Val Pro 6100	Val Gly Val Ala 6105
Gly Glu Leu Tyr Thr Ser 6110	Gly Ile Gly Leu Ala 6115	His Gly Tyr Ala 6120
Gly Arg Pro Ala Pro Thr 6125	Ala Glu Arg Phe Val 6130	Ala Cys Pro Phe 6135
Ala Pro Gly Glu Arg Met 6140	Tyr Arg Thr Gly Asp 6145	Leu Val Arg Trp 6150

Thr	Ala	Asp	Gly	Arg	Leu	Leu	Phe	Ala	Gly	Arg	Ala	Asp	Asn	Gln
6155						6160					6165			
Val	Lys	Ile	Arg	Gly	Phe	Arg	Val	Glu	Pro	Gly	Glu	Leu	Glu	Thr
6170						6175					6180			
Val	Leu	Ser	Gly	His	Pro	Ala	Val	Ala	Arg	Ala	Ala	Val	Leu	Ala
6185						6190					6195			
Arg	Glu	Asp	Thr	Pro	Gly	Ala	Lys	Arg	Leu	Val	Ala	Tyr	Val	Val
6200						6205					6210			
Pro	Ala	Arg	Pro	Asp	Glu	Asp	Gly	Asp	Ala	Leu	Ala	Glu	Ser	Val
6215						6220					6225			
Arg	Ala	Tyr	Ala	Ala	Arg	Gln	Val	Pro	Asp	Tyr	Leu	Met	Pro	Ala
6230						6235					6240			
Ala	Thr	Val	Val	Leu	Pro	Asp	Leu	Pro	Leu	Thr	Ser	Ser	Gly	Lys
6245						6250					6255			
Val	Asp	Arg	Ala	Ala	Leu	Pro	Ala	Pro	Asp	Val	Pro	Gly	Gly	Pro
6260						6265					6270			
Gly	Arg	Ala	Ala	Gly	Thr	Leu	Thr	Glu	Glu	Ile	Leu	Cys	Gly	Val
6275						6280					6285			
Phe	Ala	Gln	Val	Leu	Gly	Leu	Pro	Thr	Val	Gly	Val	Asp	Asp	Asp
6290						6295					6300			
Phe	Phe	Ala	Ser	Gly	Gly	His	Ser	Leu	Leu	Ala	Thr	Arg	Leu	Val
6305						6310					6315			
Ser	Arg	Leu	Arg	Ala	Val	Phe	Gly	Ala	Glu	Leu	Pro	Ile	Arg	Ala
6320						6325					6330			
Val	Phe	Glu	Ala	Pro	Thr	Pro	Ala	Thr	Leu	Ala	Thr	Arg	Leu	Gly
6335						6340					6345			
Ala	Ser	Ala	Pro	Arg	Arg	Leu	Ala	Leu	Gly	Glu	Arg	Ala	Arg	Pro
6350						6355					6360			
Glu	Asn	Val	Pro	Leu	Ser	Tyr	Ala	Gln	Arg	Arg	Leu	Trp	Phe	Leu
6365						6370					6375			
Asp	Arg	Leu	Glu	Gly	Gln	Asp	Gly	Thr	Tyr	Thr	Ile	Pro	Leu	Thr
6380						6385					6390			
Val	Arg	Leu	Asp	Gly	Pro	Val	Asp	Arg	Ala	Ala	Leu	Ala	Ala	Ala
6395						6400					6405			
Leu	Arg	Asp	Val	Leu	Glu	Arg	His	Glu	Val	Leu	Arg	Thr	Val	Phe
6410						6415					6420			
Pro	Leu	Val	Asp	Gly	Glu	Pro	Val	Gln	Arg	Val	Leu	Pro	Val	His
6425						6430					6435			
Asp	Thr	Gly	Phe	Thr	Leu	Gly	Gly	Gly	Asp	Val	Ala	Ala	Ala	Asp
6440						6445					6450			

Leu Gly 6455	Ala Ala Val Ala Glu 6460	Ala Thr Ala Gly Thr 6465	Phe Asp Leu
Ala Ala 6470	Glu Ile Pro Val Arg 6475	Ala Trp Leu Phe Arg 6480	Ala Gly Pro
Glu Asp 6485	His Thr Leu Val Leu 6490	Leu Val His His Val 6495	Ala Gly Asp
Gly Trp 6500	Ser Met Thr Pro Leu 6505	Ala Arg Asp Ile Ala 6510	Thr Ala Tyr
Asp Ser 6515	Arg Arg Glu Ser Arg 6520	Ala Pro Gln Trp Glu 6525	Pro Leu Pro
Val Gln 6530	Tyr Ala Asp Tyr Ala 6535	Leu Trp Gln Arg Glu 6540	Leu Leu Gly
Ala Glu 6545	Asp Asp Pro Glu Ser 6550	Leu Leu Ser Arg Gln 6555	Leu Ala Tyr
Trp Arg 6560	Asp Ala Leu Asp Gly 6565	Val Pro Glu Glu Leu 6570	Asp Leu Pro
Ala Asp 6575	Arg Pro Arg Pro Ala 6580	Glu Ala Thr His Arg 6585	Gly His Glu
Val Pro 6590	Val Arg Val Pro Ala 6595	Glu Val His Arg Arg 6600	Leu Ala Glu
Leu Ala 6605	Arg Ser Glu Gly Val 6610	Thr Val Phe Met Val 6615	Leu Gln Ala
Ala Phe 6620	Gly Thr Leu Leu Ser 6625	Arg Leu Gly Ala Gly 6630	Ala Asp Ile
Pro Ile 6635	Gly Thr Ala Val Ala 6640	Gly Arg Thr Asp Gln 6645	Ala Leu Asp
Glu Leu 6650	Val Gly Phe Phe Val 6655	Asn Thr Leu Val Ile 6660	Arg Ala Asp
Leu Ser 6665	Gly Asp Pro Thr Phe 6670	Arg Glu Leu Leu Gly 6675	Arg Val Arg
Ala Thr 6680	Gly Leu Ser Ala Tyr 6685	Glu His Gln Asp Val 6690	Pro Phe Glu
Arg Leu 6695	Val Glu Val Leu Ala 6700	Pro Ala Arg Ser Leu 6705	Ala Arg His
Pro Leu 6710	Phe Gln Val Met Leu 6715	Thr Leu Gln Asn Thr 6720	Gly Arg Ala
Asp Ala 6725	Gly Asp Gln Ala Val 6730	Pro Pro Ala Ala Gly 6735	Ser Ala Ala
Ala Lys 6740	Phe Asp Leu Glu Ile 6745	Ser Ile Ala Glu Thr 6750	Phe Ala Ala
Asp Gly	Glu Pro Ala Gly Leu	Ser Gly Val Leu Ile	Ala Ala Ala

6755	6760	6765
Asp Leu Phe Glu Pro Ala Thr	Ala Ala Ala Phe Ala	Glu Arg Leu
6770	6775	6780
Ala Arg Val Leu Ala Ala Ala	Gly Ala Asp Pro Arg	Leu Arg Val
6785	6790	6795
Ser Gln Val Asp Ile Leu Ser	Ala Glu Glu Arg Glu	Ala Val Leu
6800	6805	6810
Ser Gly Gly Asn Gly Gly Thr	Ala Pro Val Pro Val	Thr Thr Val
6815	6820	6825
Pro Ala Leu Phe Ala Glu Gln	Ala Arg Arg Thr Pro	Gly Ala Val
6830	6835	6840
Ala Ala Leu Ser Glu Gly Met	Ser Leu Thr Tyr Ala	Asp Leu Ala
6845	6850	6855
Ala Arg Val Asn Arg Leu Ala	Arg His Leu Val Ser	Leu Gly Ala
6860	6865	6870
Gly Pro Glu Thr Val Val Gly	Ile Ala Met Ser Arg	Gly Leu Asp
6875	6880	6885
Met Leu Val Ala Val Leu Ala	Val Gly Gln Ala Gly	Ala Ala Tyr
6890	6895	6900
Leu Pro Val Asp Pro Ser Tyr	Pro Asp Glu Arg Lys	Glu Phe Met
6905	6910	6915
Leu Thr Asp Ala Gly Ala Ala	Tyr Val Leu Thr Leu	Ala Ser Asp
6920	6925	6930
Ala Asp Arg Val Pro Pro Gly	Thr Pro Ala Ala Ala	Val Val Leu
6935	6940	6945
Asp Glu Pro Val Thr Ala Ala	Arg Ile Ala Gly Leu	Asp Pro Ala
6950	6955	6960
Asp Leu Thr Asp Ala Asp Arg	Val Ala Pro Leu Leu	Pro Ala His
6965	6970	6975
Arg Ala Tyr Val Ile Tyr Thr	Ser Gly Ser Thr Gly	Arg Pro Lys
6980	6985	6990
Gly Val Ala Val Glu His Arg	Thr Val Val Asn Leu	Leu Ser Trp
6995	7000	7005
Ala Ala Gly Arg Phe Gly Gly	Ala Asp Phe Ala Arg	Thr Leu Ala
7010	7015	7020
Ala Thr Ser Leu Asn Phe Asp	Val Ser Val Phe Glu	Ile Phe Gly
7025	7030	7035
Pro Leu Val Ser Gly Gly Ser	Ile Glu Ile Val Thr	Asp Leu Leu
7040	7045	7050
Ala Leu Ala Asp Pro Ala Ser	Pro Ala Trp Glu Ala	Ser Leu Val
7055	7060	7065

Ser Gly	Val Pro Ser Ala Phe	Ser Arg Val Leu Asp	Arg Gly Asp
7070	7075	7080	
Ile Ala	Ala Arg Thr Arg Ser	Val Val Leu Ala Gly	Glu Ala Leu
7085	7090	7095	
Thr Ala	Asp Val Val Asn Ala	Thr Arg Ala Ala Leu	Pro Gly Val
7100	7105	7110	
Arg Val	Ala Asn Ile Tyr Gly	Pro Thr Glu Ala Thr	Val Tyr Ser
7115	7120	7125	
Thr Ala	Trp His Thr Asp Arg	Asp Val Thr Gly Gly	Ala Ala Pro
7130	7135	7140	
Ile Gly	Arg Pro Val Thr Asn	Thr Arg Ala Tyr Val	Leu Asp Asp
7145	7150	7155	
Arg Leu	Thr Pro Val Pro Pro	Gly Val Val Gly Glu	Leu Tyr Leu
7160	7165	7170	
Ala Gly	Ala Gln Leu Ala Arg	Gly Tyr Leu Gly Arg	Pro Gly Leu
7175	7180	7185	
Thr Gly	Glu Arg Phe Val Ala	Cys Pro Phe Gly Pro	Gly Gly Glu
7190	7195	7200	
Arg Met	Tyr Arg Thr Gly Asp	Arg Val Arg Trp Asn	Ala Asp Gly
7205	7210	7215	
Asp Leu	Val Phe Ala Gly Arg	Ala Asp Asp Gln Val	Lys Ile Arg
7220	7225	7230	
Gly Phe	Arg Ile Glu Pro Gly	Glu Val Gln Ala Val	Val Ala Arg
7235	7240	7245	
Gln Ala	Gly Val Ala Arg Ala	Val Val Leu Ala Arg	Ser Asp Ser
7250	7255	7260	
Pro Gly	Asp Ala Arg Leu Val	Ala Tyr Val Val Pro	Ala Asp Arg
7265	7270	7275	
Asp Ala	Asp Arg Arg Ala Leu	Ala Ala Thr Val Arg	Ser Asp Thr
7280	7285	7290	
Ala Arg	Glu Leu Pro Ala Tyr	Leu Val Pro Ala Ala	Val Val Val
7295	7300	7305	
Leu Asp	Glu Leu Pro Val Thr	Ala Asn Gly Lys Leu	Asp Arg Arg
7310	7315	7320	
Ala Leu	Pro Ala Pro Gly Leu	Ala Glu Ala Gly Ser	Gly Arg Gly
7325	7330	7335	
Pro Val	Thr His Arg Glu Glu	Val Leu Cys Glu Val	Phe Ala Gln
7340	7345	7350	
Val Leu	Gly Leu Pro Ser Val	Gly Val Asp Asp Asp	Phe Phe Ala
7355	7360	7365	

7670					7675					7680				
Arg Leu	Arg	Ala	Val	Ala	Arg	Arg	Leu	Gly	Val	Ser	Pro	Ala	Thr	
7685					7690					7695				
Val Met	His	Val	Ala	Trp	Ala	Arg	Val	Leu	Gly	Val	Ile	Ser	Gly	
7700					7705					7710				
Arg Asp	Asp	Val	Val	Phe	Gly	Thr	Leu	Leu	Leu	Gly	Arg	Phe	Ser	
7715					7720					7725				
Thr Gly	Ala	Asp	Arg	Val	Pro	Gly	Pro	Phe	Ile	Asn	Thr	Leu	Pro	
7730					7735					7740				
Val Arg	Ala	Arg	Leu	Gly	Gly	Thr	Gly	Ala	Ala	Ala	Ala	Val	Ala	
7745					7750					7755				
Glu Met	Arg	Arg	Leu	Leu	Ala	Glu	Leu	Leu	Glu	His	Glu	His	Ala	
7760					7765					7770				
Pro Leu	Thr	Thr	Ala	Gln	Gln	Ala	Ser	Gly	Leu	Ser	Gly	Asn	Leu	
7775					7780					7785				
Pro Leu	Phe	Thr	Ala	Leu	Phe	Asn	Tyr	Arg	His	Asn	Thr	Ser	Pro	
7790					7795					7800				
Gly Ala	Asp	Pro	Ser	Pro	Ala	Ala	Gly	Pro	Thr	Glu	Gly	Ile	Arg	
7805					7810					7815				
Pro Val	Ser	Met	Arg	Glu	Arg	Thr	Asn	Tyr	Pro	Ile	Ser	Val	Ala	
7820					7825					7830				
Val Asp	Asp	Asp	Gly	Glu	Gly	Leu	Gly	Val	Ala	Val	Asn	Ala	Ile	
7835					7840					7845				
Pro Pro	Val	Arg	Pro	Glu	Ala	Val	Cys	Glu	Leu	Val	Ala	Thr	Ala	
7850					7855					7860				
Thr Glu	Ser	Leu	Thr	Ser	Ala	Leu	Glu	Leu	Phe	Leu	Asp	Gly	Gly	
7865					7870					7875				
Pro Asp	Thr	Ala	Val	Gly	Glu	Leu	Asp	Val	Leu	Pro	Pro	Gly	Glu	
7880					7885					7890				
Arg Ser	Arg	Leu	Leu	Val	Glu	Trp	Asn	Asp	Thr	Ala	Arg	Pro	Val	
7895					7900					7905				
Val Glu	Ser	Ser	Val	Pro	Ala	Leu	Phe	Ala	Glu	Arg	Val	Ala	Ala	
7910					7915					7920				
Ala Pro	Asp	Ala	Val	Ala	Val	Val	Gly	Glu	Gly	Val	Ser	Trp	Ser	
7925					7930					7935				
Tyr Arg	Glu	Leu	Asp	Arg	Arg	Ser	Asp	Val	Leu	Ala	Arg	Ser	Leu	
7940					7945					7950				
Val Ala	Ala	Gly	Val	Gly	Leu	Glu	Ser	Pro	Val	Val	Val	Ala	Leu	
7955					7960					7965				
Glu Arg	Ser	Ala	Asp	Val	Leu	Thr	Ala	Phe	Leu	Ala	Val	Ala	Lys	
7970					7975					7980				

Pro Gly 8285	Glu Val Glu Ala Val	Leu Ala Gln His Pro	Asp Val Ser 8295
Gln Val 8300	Ala Val Val Val Arg	Glu Asp Ala Pro Gly	Asp Lys Arg 8310
Leu Val 8315	Ala Tyr Val Val Gly	Gly Asp Val Glu Ala	Tyr Ala Gln 8325
Glu Arg 8330	Leu Pro Gly Tyr Met	Val Pro Ser Ala Phe	Val His Leu 8340
Glu Ala 8345	Leu Pro Leu Thr Ala	Asn Gln Lys Val Asp	Arg Ala Ala 8355
Leu Pro 8360	Ala Pro Glu Arg Glu	Thr Thr Thr Pro Gly	Lys Ala Pro 8370
Ala Pro 8375	Gly Pro Leu Gly Asn	Leu Glu Glu Ser Met	Cys Gln Ala 8385
Phe Ala 8390	Glu Val Leu Gly Leu	Asp Ser Val Gly Pro	Asp Asp Asp 8400
Phe Phe 8405	Ala Leu Gly Gly His	Ser Leu Leu Ala Val	Ala Leu Val 8415
Gln Arg 8420	Leu Lys Ala Arg Gly	Val Ala Val Thr Val	Gln Asp Ile 8430
Met Ala 8435	Ala Pro Thr Val Ser	Glu Leu Met Gly Ser	Leu Ser Met 8445
Ser Ser 8450	Ile Arg Asp Ser Leu	Gly Thr Leu Leu Pro	Ile Arg Arg 8460
Thr Gly 8465	Glu Leu Pro Pro Leu	Phe Cys Val His Pro	Ala Gly Gly 8475
Leu Ser 8480	Trp Cys Tyr Leu Pro	Leu Ala Arg His Val	Pro Ala Asp 8490
Arg Pro 8495	Ile Tyr Gly Leu Gln	Ala Arg Gly Ala Asp	Gly Arg Glu 8505
Pro Leu 8510	Ala Pro Ser Leu Arg	Glu Met Ala Ala Asp	Tyr Val Ser 8520
Arg Met 8525	Arg Ala Val Gln Pro	Glu Gly Pro Tyr His	Val Leu Gly 8535
Phe Ser 8540	Phe Gly Val Ala Pro	Ala His Glu Ile Ala	Val Gln Leu 8550
Arg Glu 8555	Gln Gly Ala Glu Val	Val Leu Val Leu Met	Asp Ser Tyr 8565
Pro Met 8570	Glu Asp Ala Glu Ser	Gly Glu Gln Ala Ala	Asp Glu Glu 8580
Glu Leu	Pro Trp Glu Glu Leu	Ile Glu Ala Glu Phe	Gly Arg Val

8585	8590	8595
Leu Gly Gly Phe Ser Arg Asp Glu Leu Ala Ala Phe Ala Ala Val		
8600	8605	8610
Phe Arg Asn Asn Thr Lys Ile Arg Ala Arg His Arg Leu Gly Arg		
8615	8620	8625
Phe Asp Gly Asp Ala Leu Leu Ile Ala Ser Thr Asp Ser Ala Pro		
8630	8635	8640
Asp Gly Glu Ser Asn Thr Trp Arg Trp Ala Pro Tyr Ile Thr Gly		
8645	8650	8655
Glu Ile Thr Gln Val Val Leu Pro Cys Glu His Thr Asp Leu Val		
8660	8665	8670
Arg Pro Asp Met Leu Ala Leu Leu Trp Pro Ala Val Glu Ala Trp		
8675	8680	8685
Gln Ala Gly Arg His Arg Pro		
8690	8695	
<210> 16		
<211> 234		
<212> PRT		
<213> Actinoplanes sp.		
<400> 16		
Met Gln Lys Ile Pro Leu Val Cys Val Pro Phe Ala Gly Ala Gly Ala		
1	5	10 15
Ser Phe Phe His Pro Trp Ala Glu Leu Ala Gly Pro Asp Arg Pro Ile		
	20	25 30
Val Ala Leu Gln Leu Pro Gly Arg Glu Trp Arg Leu Leu Asp Glu Pro		
	35	40 45
Tyr Ala Asp Val Val Ala Ala Ala Asp Leu Ala Leu Thr Val Ala		
	50	55 60
Asp Glu Val Gly Ala Gly Gly Arg Val Ala Leu Phe Gly His Ser Leu		
65	70	75 80
Gly Ala Val Leu Ala Tyr Glu Ile Ala His Ala Leu Val Arg Asp Gly		
	85	90 95
Glu Val Gly Val Glu Arg Leu Phe Val Ser Gly Ser Pro Asp Pro Trp		
	100	105 110
Thr Pro Arg Thr Asn Arg Ala Ser Gly Leu Asp Asp Glu Glu Phe Leu		
	115	120 125
Leu Arg Val Arg Glu Phe Ala Gly Tyr Asp His Glu Ala Leu Ala Asp		
	130	135 140
Pro Asp Met Arg Glu Leu Ile Leu Pro Ala Leu Arg Ala Asp Val Glu		
145	150	155 160
Met His Glu Ser Tyr Val Ala Gly Ser Ala Asp Pro Leu Pro Ala Pro		

	165		170		175
Val Thr Ala Leu His Ala Arg Asp Asp Ala Leu Val Ser Ala Glu Gln					
	180		185		190
Thr Ala Gly Trp Ser Lys Ala Thr Ser Gly Pro Phe Gln Leu Val Glu					
	195		200		205
Val Asp Gly Gly His Met Tyr Leu Thr Glu Asp Pro Ala Gly Leu Leu					
	210		215		220
Arg Leu Ile Ala Ala Asp Leu Asp Arg Asp					
	225		230		
<210> 17					
<211> 274					
<212> PRT					
<213> Actinoplanes sp.					
<220>					
<221> misc_feature					
<222> (1)..(1)					
<223> V represents a non-standard initiator codon. It is expected that the biosynthesized protein will have a formylmethionine residue at this position					
<400> 17					
Val Arg Leu Thr Gly Lys Thr Ala Ile Val Thr Gly Ala Ala Arg Gly					
1	5		10		15
Leu Gly Arg Ala Cys Ala Val Ala Phe Ala Ala Glu Gly Ala Asp Leu					
	20		25		30
Val Leu Leu Asp Arg Ala Ala Asp Leu Pro Gly Val Pro Tyr Pro Leu					
	35		40		45
Gly Thr Val Gly Gln Leu Glu His Thr Ala Asp Leu Cys Arg Lys Gln					
	50		55		60
Gly Ala Ala Val Leu Thr Val Arg Ala Asp Val Arg Asp Leu Ala Ala					
	65		70		75
Leu Thr Ala Ala Ala Asp Arg Ala Ile Asp Arg Phe Gly Gly Ile Asp					
	85		90		95
Val Leu Val Asn Asn Ala Gly Ile Ala Ala Pro Ser Gly Lys Val Thr					
	100		105		110
His Glu Ile Thr Glu Asp Glu Trp Gln Leu Met Ile Asp Val Asp Leu					
	115		120		125
Ser Gly Ala Trp Arg Met Thr Ala Ala Val Gly Arg His Met Thr Glu					
	130		135		140
Arg Arg Ser Gly Ser Ile Val Asn Ile Ala Ser Thr Ala Gly Gln Val					
	145		150		155
Gly Tyr Arg His Phe Ala Gly Tyr Val Ala Ala Lys His Gly Ile Val					
	165		170		175

Gly Leu Thr Arg Ala Ala Ala Leu Asp Tyr Ala Pro Ala Lys Val Arg
 180 185 190

Val Asn Ala Val Cys Pro Gly Ser Val Arg Asp Asp Pro Gln Phe Glu
 195 200 205

Gly Arg Met Leu Ser Glu Ile Ala Arg Ser Leu Asp Val Pro Val Ala
 210 215 220

Glu His Glu Gln Thr Phe Leu Gln Ala Gln Pro Met Asn Ala Leu Ile
 225 230 235 240

Glu Pro Asp Asp Val Ala Asn Ala Ala Ile Trp Leu Ala Ser Asp Glu
 245 250 255

Ser Arg Gln Val Thr Gly Ser Val Val Thr Val Asp Gly Gly Phe Thr
 260 265 270

Thr Arg

<210> 18

<211> 891

<212> PRT

<213> Actinoplanes sp.

<220>

<221> misc_feature

<222> (1)..(1)

<223> V is a non-standard initiator codon. It is expected that the biosynthesized protein will have a formylmethionine residue at this position

<400> 18

Val Pro Lys Ser Gln Pro Ala Thr Arg Thr Ala Ala Pro Gly Ala Ala
 1 5 10 15

Glu Cys His Ala Leu Ala Val Arg Leu Ala Gly Pro Ile Asp Pro Ala
 20 25 30

Pro Ile Glu Arg Arg Leu Ala Ala Arg Met Pro Phe Trp His Glu His
 35 40 45

Val Ala Ala Arg Pro Gly Asp Glu Ala Ala Leu Arg Arg Arg Glu Arg
 50 55 60

Glu Leu Ala Arg Pro Val Pro Pro Glu Pro Gly Ala Arg Ala Val Leu
 65 70 75 80

Leu Ala Tyr Ala Asp Gly Ser Ala Asp Leu Val Leu Val Ala Arg Arg
 85 90 95

Asp Arg Leu Asp Arg Asp Ala Leu Ile Ala Leu Ala Arg Pro Glu Arg
 100 105 110

Ala Pro Arg Gly Arg Lys Pro Ala Glu Pro Asp Ala Pro Pro Pro Ser
 115 120 125

Ala Ala Pro Ala Trp Gly Leu Gly Asp Gly Gly Pro Asp Asp Arg Trp
 130 135 140
 Ala Glu Leu Arg Val Pro Ala Arg Gly Pro Ala Asp Pro Ala Arg Trp
 145 150 155 160
 Pro Ala Ala Leu Ala Lys Val Leu Ala Arg Tyr Glu Pro Gly Ala Ala
 165 170 175
 Ala Gly Ser Gly Ala Ala Ala Gly Leu Gly Ala Ala Ala Gly Ser Gly
 180 185 190
 Val Ala Ala Gly Ser Ser Ala Ala Ser Gly Ser Gly Ala Ala Ala Val
 195 200 205
 Pro Gly Pro Val Ala Leu Ala Phe Asp Gly Asp Leu Ala Pro Pro Asp
 210 215 220
 Glu Tyr Val Pro Phe Leu Ala Pro Thr His Pro Leu Thr Val Gln Val
 225 230 235 240
 Ser Arg Thr Pro Gly Gly Gly Thr Glu Leu Arg Cys Arg His Arg Leu
 245 250 255
 Gly Ala Val Ser Pro Ala Ala Ala Glu Ala Phe Ala Arg Met Leu Ala
 260 265 270
 Ala Ala His Gly Glu Pro Pro Ala Asp Asp Gly Ala Thr Ala Glu Pro
 275 280 285
 Thr Pro Pro Ala Ala Pro Ala Pro Ala Pro Ala Pro Ala Pro
 290 295 300
 Pro Ala Ala Ala Arg Thr Leu Thr Gly Leu Phe Ala Glu Gln Val Ala
 305 310 315 320
 Ala Arg Pro Thr Ala Val Ala Val Ser Asp Asp Arg Gly Arg His Thr
 325 330 335
 Tyr Arg Glu Leu Asp Glu Trp Ser Gly Arg Leu Ala Arg Gly Leu Arg
 340 345 350
 Lys Ala Gly Val Arg Asp Gly Asp Ala Val Gly Val Cys Leu Asp Arg
 355 360 365
 Ser Ala Glu Leu Val Ala Val Leu Leu Ala Val Leu Lys Ala Gly Ala
 370 375 380
 Ala Tyr Val Pro Leu Asp Ala Ala Tyr Pro Ala Asp Arg Ile Ala Tyr
 385 390 395 400
 Thr Val Gly Asp Ala Gly Leu Ala Val Val Val Thr Thr Ser Ala Asp
 405 410 415
 Phe Pro Asp Val Asp Gly Val Arg Leu Leu Ala Pro Glu Ser Leu Ala
 420 425 430
 Glu Ala Gly Asp Asp Pro Gly Ile Pro Leu Ala Thr Pro Ala Gly Pro
 435 440 445
 Glu Arg Pro Ala Tyr Val Ile Tyr Thr Ser Gly Ser Thr Gly Arg Pro

450					455					460						
Lys	Gly	Val	Val	Val	Pro	His	Ala	Asn	Val	Ser	Ala	Leu	Leu	Asp	Ala	
465					470					475					480	
Thr	Arg	Glu	Glu	Tyr	Ala	Leu	Gly	Pro	Gly	Asp	Val	Trp	Thr	Phe	Phe	
				485					490					495		
His	Ser	Ala	Ala	Phe	Asp	Phe	Ser	Val	Trp	Glu	Ile	Trp	Gly	Cys	Leu	
			500					505					510			
Leu	Thr	Gly	Gly	His	Leu	Val	Val	Val	Pro	Tyr	Trp	Val	Ser	Arg	Ser	
		515						520				525				
Pro	Glu	Gln	Phe	His	Asp	Leu	Leu	Ala	Glu	Arg	Gly	Val	Thr	Val	Leu	
	530					535					540					
Asn	Gln	Thr	Pro	Ser	Ser	Phe	Thr	Gln	Leu	Val	Ala	Ala	Asp	Arg	Gly	
545					550					555					560	
Ala	Glu	Arg	Asp	Leu	Ala	Val	Arg	Leu	Val	Ile	Phe	Gly	Gly	Glu	Pro	
				565					570					575		
Leu	Asp	Ala	Arg	Thr	Val	Leu	Pro	Trp	Leu	Asp	Arg	Arg	Pro	Glu	Ala	
				580				585					590			
Arg	Cys	Arg	Leu	Val	Asn	Met	Phe	Gly	Ile	Thr	Glu	Thr	Thr	Val	His	
		595					600						605			
Val	Thr	Ala	Val	Asp	Val	Thr	Arg	Ala	Ala	Ala	Leu	Ala	Gly	Ser	Arg	
	610					615					620					
Ser	Val	Gly	Arg	Pro	Leu	Pro	Gly	Trp	Ala	Val	Arg	Val	Leu	Asp	Glu	
625					630					635				640		
Gln	Arg	Arg	Glu	Val	Pro	Pro	Gly	Val	Pro	Gly	Glu	Ile	Tyr	Val	Gly	
				645					650					655		
Gly	Ala	Gly	Val	Ala	Ile	Gly	Tyr	Leu	Asn	Arg	Pro	Glu	Leu	Thr	Ala	
			660					665				670				
Glu	Arg	Phe	Val	Thr	Gly	Pro	Asp	Gly	Arg	Arg	Trp	Tyr	Arg	Ser	Gly	
		675					680					685				
Asp	Arg	Gly	Arg	Leu	Leu	Pro	Asp	Gly	Thr	Leu	Glu	His	Leu	Gly	Arg	
	690					695				700						
Leu	Asp	Asp	Gln	Val	Lys	Leu	Arg	Gly	Phe	Arg	Ile	Glu	Leu	Asp	Glu	
705					710					715				720		
Ile	Arg	Gly	Val	Leu	Thr	Glu	Cys	Ala	Gly	Val	Ala	Ala	Ala	Ala	Val	
				725					730				735			
Val	Ile	Arg	Arg	Ser	Thr	Pro	Asp	Asp	Pro	Ala	Thr	Ala	Arg	Leu	Asp	
				740				745				750				
Ala	Tyr	Val	Val	Ala	Glu	Ala	Gly	Ala	Thr	Pro	Pro	Val	Ala	Glu	His	
		755					760				765					
Ala	Ala	Arg	Met	Leu	Pro	Ala	Tyr	Met	Cys	Pro	Ala	Thr	Phe	Thr	Phe	
	770					775				780						

Leu Asp Ala Leu Pro Met Thr Pro Asn Gly Lys Val Asp Lys Ala Ala
785 790 795 800

Leu Pro Glu Pro Ala Arg Pro Ala Ala Asp Ala Ala Ala Thr Pro Ala
805 810 815

Gly Pro Gly Glu Asp Gly Leu Ala Gly Asp Leu Ala Asp Val Trp Gln
820 825 830

Gln Val Phe Gly Cys Pro Val Thr Val Ser Asp Asn Phe Phe Asp Leu
835 840 845

Gly Gly Asn Ser Leu Leu Ala Val Arg Met Ala Ala Leu Met Arg Arg
850 855 860

Arg Gly Leu Pro Arg Leu His Pro Arg Thr Leu Tyr Leu His Pro Thr
865 870 875 880

Val Arg Gly Leu Ala Asp Ala Leu Arg Ser Ala
885 890

<210> 19
<211> 187
<212> PRT
<213> Actinoplanes sp.

<400> 19.

Met Arg Asn Leu Arg Arg Thr Thr Gly Ile Gly Leu Leu Ala Leu Leu
1 5 10 15

Ser Val Ala Ala Cys Ser Ser Thr Pro Ala Ala Ser Glu Pro Pro Pro
20 25 30

Ser Ala Ala Pro Pro Ser Ala Val Thr Ala Thr Gly Pro Ala Ala Glu
35 40 45

Lys Ala Val Lys Ser Gly Thr Gln Thr Tyr His Gln Ala Leu Asp Ala
50 55 60

Phe Val Ala Ala Ser Asn Lys Gly Thr Thr Asp Thr Thr Glu Ile Gly
65 70 75 80

Lys Tyr Ala Ser Gly Arg Ala Leu Met Thr Phe Gln Gly Ile Leu Ala
85 90 95

Ser Tyr Gln Gln Gln Gly Val His Thr Ser Gly Glu Pro Arg Ile Asp
100 105 110

Glu Pro Val Val Thr Gly Leu Thr Pro Pro Ala Asp Pro Thr Gly Val
115 120 125

Gln Leu Arg Gly Cys Ile Asp Ile Ser Ala Trp Pro Leu Thr Lys Ala
130 135 140

Asp Gly Thr Pro Ala Asp Lys Val Gly Gly Gln Gln Gly Ser Gly Pro
145 150 155 160

Ser Ala Ile Leu Ala Asn Val Ala Arg Ser Gly Ala Thr Trp Gln Val
165 170 175

Thr Glu Leu Ala Ile Gln Gly Pro Cys Ala Ala
 180 185

<210> 20<211> 415

<212> PRT

<213> Actinoplanes sp.

<220>

<221> misc_feature

<222> (1)..(1)

<223> V represents a non-standard initiator codon. It is expected that the biosynthesized protein will have a formylmethionine residue at this position

<400> 20

Val Thr Val Arg Arg Trp Leu Pro Ala Gly Leu Thr Val Leu Ala Phe
 1 5 10 15

Ala Ala Gly Phe Trp Gln Lys Leu Pro Cys Gln Ala Ala Gly Trp Pro
 20 25 30

Asp Asp Thr Ala Thr Leu Phe Gly Arg Tyr Cys Tyr Ser Asp Val Pro
 35 40 45

Ile Leu Phe Arg Glu Arg Gly Leu Phe Asp Gly Ile Phe Pro Tyr Glu
 50 55 60

Ser Gly Pro Gly Ala Gln Pro Leu Glu Tyr Pro Val Leu Thr Gly Tyr
 65 70 75 80

Leu Met Asp Ala Thr Ala Arg Leu Val Arg Ala Ile Leu Pro Gly Ala
 85 90 95

Asp Val Ala Val Ala Ser Arg Ala Tyr Phe Leu Thr Thr Val Leu Val
 100 105 110

Leu Leu Ala Leu Ala Val Leu Thr Val Trp Ala Thr Gly Ala Val Leu
 115 120 125

Arg Arg Thr Gly Gly Arg Pro Gly Asp Ala Leu Leu Val Ala Ala Ala
 130 135 140

Pro Val Leu Ile Leu Ala Gly Thr Val Asn Trp Asp Leu Leu Ala Val
 145 150 155 160

Ala Ala Ala Val Leu Ala Ile Leu Ala Trp Glu Arg Asp Arg Pro Leu
 165 170 175

Leu Ala Gly Val Leu Ile Gly Leu Gly Thr Ala Ala Lys Leu Phe Pro
 180 185 190

Leu Val Leu Leu Gly Pro Val Leu Leu Leu Cys Leu Arg Gln Arg Arg
 195 200 205

Met Arg Arg Phe Ala Arg Val Ala Ala Gly Ala Ala Gly Ala Trp Leu
 210 215 220

Leu Val Asn Leu Pro Val Val Ala Leu Gln Pro Asp Gly Trp Met Glu
 225 230 235 240

Phe Trp Arg Phe Asn Ala Gly Arg Gly Ala Glu Phe Gly Ser Leu Trp
 245 250 255
 Phe Ala Leu Asp Gly Leu Gly Leu His Met Pro Ala Val Asn Ala Val
 260 265 270
 Ala Leu Ala Thr Phe Gly Val Leu Leu Ala Gly Ile Ala Val Leu Ala
 275 280 285
 Leu Arg Ser Arg Arg Pro Pro Asp Leu Ala Gln Leu Ala Cys Leu Ala
 290 295 300
 Val Gly Ala Phe Leu Leu Thr Asn Lys Val Tyr Ser Pro Gln Tyr Ala
 305 310 315 320
 Leu Trp Leu Leu Pro Leu Val Val Ile Ala Arg Gly Arg Val Pro Arg
 325 330 335
 Trp Pro Val Val Arg Asp Trp Ala Val Trp Gln Ala Ala Glu Val Leu
 340 345 350
 Tyr Trp Leu Ala Val Trp Ser Trp Leu Ala Gly Ser Leu Thr Asp Glu
 355 360 365
 Arg Gln Tyr Ala Trp Ala Thr Val Leu Arg Val Leu Ala Thr Ala Tyr
 370 375 380
 Val Cys Gly Gln Val Val Trp Asp Val Leu Ala Ala Pro Arg Pro His
 385 390 395 400
 Arg Pro Ala Pro Pro Pro Ala Val Ala Glu Pro Ala His Pro Gly
 405 410 415

<210> 21
 <211> 491
 <212> PRT
 <213> Actinoplanes sp.

<220>
 <221> misc_feature
 <222> (1)..(1)
 <223> V represents a non-standard initiator codon. It is expected that
 the biosynthesized protein will have a formylmethionine residue
 at this position

<400> 21

Val Ala Ala Gln Pro Glu Glu Phe Asp Val Ile Val Val Gly Gly Gly
 1 5 10 15
 Pro Gly Gly Ser Thr Ala Ala Ala Leu Thr Ala Lys Gln Gly Ala Lys
 20 25 30
 Val Leu Leu Leu Glu Arg Glu Lys Phe Pro Arg Tyr Gln Ile Gly Glu
 35 40 45
 Ser Leu Leu Pro Ser Thr Val His Gly Val Cys Asn Leu Leu Gly Val
 50 55 60
 Gly Asp Glu Ile Ala Lys Ala Gly Phe Met Arg Lys His Gly Gly Thr

65		70		75		80
Phe Lys Trp Gly Thr Ser Thr Glu Pro Trp Thr Phe Thr Phe Ala Thr						
	85			90		95
Ser Pro Arg Met Ala Gly Pro Thr Ser His Ala Phe Gln Val Glu Arg						
	100			105		110
Arg Arg Phe Asp Gln Ile Leu Leu Glu Asn Ala Arg Arg Leu Gly Val						
	115			120		125
Asp Val Arg Glu Asn His Pro Val Thr Glu Ala Ile Ala Asp Asp Glu						
	130			135		140
Arg Val Arg Gly Val Arg Phe Thr Gln Asp Gly Gln Thr Arg Thr Ala						
	145			150		155
Leu Ala Arg Phe Val Val Asp Ala Ser Gly Asn Arg Ser Thr Leu His						
	165			170		175
Thr Thr Val Gly Gly Thr Arg Glu Tyr Ser Pro Phe Phe Arg Asn Leu						
	180			185		190
Ala Leu Phe Gly Tyr Phe Glu Asn Gly Arg Arg Leu Pro Ala Pro Asn						
	195			200		205
Ser Gly Asn Ile Leu Cys Val Ala Phe Gly Ser Gly Trp Phe Trp Tyr						
	210			215		220
Ile Pro Leu Ser Glu Thr Leu Thr Ser Val Gly Ala Val Val Arg Arg						
	225			230		235
Glu Met Ala His Lys Val Gln Gly Asp Gln Glu Lys Ala Leu Phe Glu						
	245			250		255
Leu Ile Ala Glu Cys Pro Met Ile Ala Asp Phe Leu Gly Asp Ala Thr						
	260			265		270
Arg Val Thr Glu Gly Asp Tyr Gly Gln Ile Arg Val Arg Lys Asp Tyr						
	275			280		285
Ser Tyr Ser Ser Thr Ser Tyr Trp Arg Pro Gly Met Cys Leu Val Gly						
	290			295		300
Asp Ala Ala Cys Phe Ile Asp Pro Val Phe Ser Ser Gly Val His Leu						
	305			310		315
Ala Thr Tyr Ser Gly Leu Leu Ala Ala Arg Ser Ile Asn Ser Val Leu						
	325			330		335
Ala Gly Thr Val Asp Glu Asp Arg Ala Phe Thr Glu Phe Glu Gln Arg						
	340			345		350
Tyr Arg Arg Glu Phe Gly Val Phe His Asp Phe Leu Val Ser Phe Tyr						
	355			360		365
Asp Met His Val Asp Glu Ser Ser Tyr Phe Trp Ala Ala Arg Lys Val						
	370			375		380
Thr Glu Ser Ser Ala Pro Ala Met Glu Ser Phe Thr Glu Leu Val Gly						
	385			390		395
						400

Gly Ile Ala Ser Gly Glu Asp Ala Leu Thr Gly Ser Thr Glu Leu Val
405 410 415

Arg Arg His Ser Arg Gln Thr Ala Glu Leu Gly Gln Ala Val Ala Gly
420 425 430

Leu Glu Glu Gly Gly Thr Gly Phe Leu Arg Gly Ser Ser Val Val Ala
435 440 445

Gln Ala Met Phe Glu Gly Ser Gln Ile Gln Ala Gly Ala Ile Leu Gly
450 455 460

Pro Glu Gly Thr Gln Glu Gln Pro Leu Phe Glu Gly Gly Leu Thr Pro
465 470 475 480

Ser Gly Asn Gly Leu Thr Trp Val Ala Ala Asp
485 490

<210> 22

<211> 217

<212> PRT

<213> Actinoplanes sp.

<400> 22

Met Thr Ile Arg Val Leu Ile Ala Asp Asp Gln Ala Met Ile Arg Ser
1 5 10 15

Gly Leu Arg Leu Ile Leu Glu Asp Glu Pro Asp Ile Glu Val Val Ala
20 25 30

Glu Ala Val Asp Gly Val Asp Ala Val Ala Gln Ala Arg Lys Leu Arg
35 40 45

Pro Asp Val Cys Leu Val Asp Ile Arg Met Pro Arg Ile Asp Gly Ile
50 55 60

Glu Val Thr Arg Ser Leu Ala Gly Pro Gly Val Val Asn Pro Leu Arg
65 70 75 80

Val Ile Val Val Thr Thr Phe Asp Ser Asp Glu Tyr Val Tyr Gly Ala
85 90 95

Leu Arg Gly Gly Ala Val Gly Phe Ile Leu Lys Asp Ala Gly Pro Thr
100 105 110

Leu Leu Val Glu Ala Val Arg Ala Ala His Lys Gly Asp Ala Leu Val
115 120 125

Ser Pro Ser Val Thr Val Arg Leu Leu Asn His Leu Asn Ala Ser Ala
130 135 140

Ala Pro Ala Gly Ser Glu Pro Ile Pro Leu Ser Asp Arg Glu Leu Glu
145 150 155 160

Val Ala Arg Ala Ile Ala Arg Gly Arg Thr Asn Gln Glu Ile Ala Ala
165 170 175

Asp Leu Phe Ile Ser Leu Ser Thr Val Lys Gly His Ala Ser Thr Ile
180 185 190

Gln Ser Lys Leu Gly Val Arg Asn Arg Val Gly Val Ala Ala Trp Ala
 195 200 205

Trp Glu Asn Arg Leu Val Glu Gly Ser
 210 215

<210> 23
 <211> 403
 <212> PRT
 <213> Actinoplanes sp.

<400> 23

Met Asn Ile Ala Ala Ala Thr Gly Pro Ala Ala Gly Asp Gly Ala Gly
 1 5 10 15

Ile Arg Thr Leu Gly Ser Val Arg Thr Ala Asp Arg Thr Thr Thr Met
 20 25 30

Val Ala Asp Ala Gly Leu Ala Val Leu Phe Val Ala Ala Val Val Val
 35 40 45

Glu Ala Val Ala Val Ala Gln Ser Trp Gly Leu Ala Tyr Trp Leu Ile
 50 55 60

Gly Gly Ala Ala Ala Thr Leu Val Cys Leu Leu Ala Leu Ile Arg Arg
 65 70 75 80

Arg Gly Pro Val Pro Cys Ala Ala Ala Gly Leu Thr Ile Ala Ala Gly
 85 90 95

Ala Val Val Thr Ala Ala Val Leu His Met Pro Ala Glu Pro Gly Pro
 100 105 110

Ala Met Ala Leu Ala Leu Ala Val Leu Thr Gly Ser Ala Val Arg Ala
 115 120 125

Ala Pro Thr Ile Pro Ala Phe Ala Val Gly Gly Ala Ala Leu Gly Val
 130 135 140

Val Ala Leu Ser Gln Val Ala Ala Ala Thr Trp Asp Ala Gly Pro Ala
 145 150 155 160

Pro Val Thr Trp Leu Asn Ile Leu Thr Trp Leu Gly Gly Thr Ala Thr
 165 170 175

Gly Leu Ser Leu Arg Thr Val Asp Gly Arg Ala Arg Ala Asn Ala Glu
 180 185 190

Arg Ile Arg Gln Glu Glu Arg Leu Glu Leu Ala Arg Glu Leu His Asp
 195 200 205

Val Val Ala His His Ile Thr Gly Met Ile Leu Gln Thr Gln Ala Ala
 210 215 220

Gln Val Leu Ala Arg Arg Asp Ala Gly Arg Val Pro Glu Arg Leu Ala
 225 230 235 240

Val Ile Glu Thr Ala Gly Thr Glu Ala Leu Ala Ala Met Arg Arg Val
 245 250 255

Val Gly Leu Leu Arg Asp Ala Asp Asp Gly Pro Pro Ser Ala Pro Glu
 260 265 270
 Pro Glu Glu Leu Ser Thr Leu Val Glu Arg Phe Ser Arg Gln Gly Gly
 275 280 285
 Pro Val Arg Leu Thr Thr Pro Asp Gly Met Lys Gln Trp Pro Ile Glu
 290 295 300
 Val Thr Thr Thr Val Tyr Arg Ile Val Arg Glu Ala Leu Thr Asn Val
 305 310 315 320
 Ala Arg His Ala Pro His Ala Pro Asn Val Thr Val Thr Val Thr Val
 325 330 335
 Glu Gln Ala Asp Glu Ile Arg Val Glu Val Thr Asn Asp Ala Ala Ala
 340 345 350
 Ala Pro Pro Arg Leu His His Arg Gly Gly Tyr Gly Leu Val Gly Met
 355 360 365
 Arg Glu Arg Val Glu Ser Leu Gly Gly Thr Leu Ser Thr Gly Pro Arg
 370 375 380
 Pro Gly Gly Gly Trp Ser Val Ala Ala Thr Leu Pro Asn Pro Pro Arg
 385 390 395 400
 Glu Arg Arg

<210> 24
 <211> 309
 <212> PRT
 <213> Actinoplanes sp.

<400> 24

Met Lys Ala Met Ser His Glu Arg Ser Thr Pro Val Leu Gln Ala Glu
 1 5 10 15
 Gly Leu Thr Lys Arg Tyr Gly Arg Arg Arg Ala Leu Thr Asp Cys Thr
 20 25 30
 Leu Ser Val Pro Ser Gly Arg Val Ile Ala Leu Val Gly Pro Arg Gly
 35 40 45
 Ser Gly Lys Ser Thr Leu Leu Gln Leu Cys Cys Gly Met Val Ala Pro
 50 55 60
 Ser Arg Gly Arg Ile Arg Val Leu Gly Glu Arg Pro Asp Ala Gly Ala
 65 70 75 80
 Ala His Leu Ala Arg Val Gly Tyr Val Pro Arg Glu Pro Ala Val Tyr
 85 90 95
 Gly Ser Phe Thr Val Glu Asp His Leu Thr Met Gly Ala Arg Leu Asn
 100 105 110
 Pro Arg Trp Asp Arg Arg Leu Ala Asp Arg Arg Ile Ala Ser Ala Gly
 115 120 125

Ile Pro Arg Thr Arg Arg Ala Asp Arg Leu Ser Ala Gly Gln Arg Ala
 130 135 140

Glu Leu Ala Leu Thr Leu Ala Gly Gly Lys Arg Pro Glu Leu Leu Val
 145 150 155 160

Leu Asp Glu Pro Gly Ala Val Leu Asp Ala Pro Ala Arg Ala Ser Phe
 165 170 175

Leu Arg Gly Val Leu Asp Phe Val Ala Glu Ile Asp Ala Ser Val Leu
 180 185 190

Ile Ser Gly His Pro Ser Gly Glu Val Glu Arg Leu Cys Asp His Leu
 195 200 205

Ile Val Leu Ser Asp Ser Arg Val Leu Val Ala Gly Asp Val Arg Asp
 210 215 220

Leu Leu Ala Arg His His Arg Ile Ile Ala Pro Arg Gly Glu Leu Asp
 225 230 235 240

Arg Leu Pro Pro Gly Met Glu Pro Ile Trp Val Glu Asp Phe Gly Ser
 245 250 255

Tyr Ser Gly Gly Val Val Arg Ala Glu Val Asp Leu Pro Arg Arg Pro
 260 265 270

Trp Thr Val Glu Arg Val Glu Leu Glu Glu Leu Val Leu Ser Tyr Leu
 275 280 285

Ser Arg Ala Ser Gly Ala Pro Ala Leu Ala Gly Cys Leu Ile Ala Pro
 290 295 300

Gly Gln Pro Gly Ser
 305

<210> 25
 <211> 553
 <212> PRT
 <213> Actinoplanes sp.

<220>
 <221> misc_feature
 <222> (1)..(1)
 <223> V represents a non-standard initiator codon. It is expected that
 the biosynthesized protein will have a formylmethionine residue
 at this position

<400> 25

Val Thr Ala Ala Ala Leu Glu Lys Leu Leu Gly Asp Ala Arg Asp Pro
 1 5 10 15

Gly Asn Pro Val Gly Tyr Ala Ala Val Leu Ala Ala Asp Glu Arg Gln
 20 25 30

Glu Met Leu Ala Glu Gly Glu Arg Leu Leu Asp Arg Tyr Gln Leu Asn
 35 40 45

Ala Glu Phe Val Pro Val Ala Tyr Gly Gly Arg Leu Ala Arg Ala Asp

50	55	60
Arg Leu Ala Glu Val 65	Leu Arg Ala Val Trp 70	Arg Arg Asp Pro Cys Leu 75 80
Gly Leu Gly Tyr 85	Gly Phe Ser Ser Leu 90	Ile Ala Ser Val Asn Val Trp 95
Cys Ala Gly Asn Glu Glu Gln Arg Arg Arg Ala Ala Gly Leu Leu Leu 100 105 110		
Ala Asn Lys Arg Ile Ala Ala Ala Phe His Glu Leu Ala His Gly Thr 115 120 125		
Asp Phe Ser Ala Ala Glu Cys Ala Ala Arg Pro Ala Gly Gly Gly Trp 130 135 140		
Val Leu Ser Gly His Lys Glu Ile Val Thr Asn Leu Arg Arg Ala Glu 145 150 155 160		
Ala Met Val Leu Phe Ala Arg Thr Gly Glu Ala Arg Gly Ser Arg Ser 165 170 175		
His Ser Gln Phe Leu Leu Val Arg Asp Glu Leu Pro Ala Ala Arg Ala 180 185 190		
Val Asp Arg Pro Arg Tyr Pro Gly Ser Gly Met Arg Gly Ile Asp Leu 195 200 205		
Gly Gly Leu Val Phe Asp Asp Cys Pro Val Pro Ser Ser Ala Leu Leu 210 215 220		
Gly Glu Gln Gly His Gly Ile Glu Val Ala Leu Arg Ala Tyr Gln Val 225 230 235 240		
Thr Arg Met Val Ser Pro Ala Leu Leu Val Gly Pro Leu Asp Ser Ala 245 250 255		
Val Arg Leu Ala Thr Glu Met Ala Met Glu Arg Arg Leu Tyr Gly Ala 260 265 270		
Ala Val Ala Asp Leu Pro Tyr Val Arg Thr Thr Ile Ala Arg Ala Tyr 275 280 285		
Ala Ala Leu Leu Thr Val Asp Val Phe Ser Gly Val Gly Leu Arg Ala 290 295 300		
Leu His Leu Leu Pro Glu Ala Thr Ala Gly Tyr Ala Pro Ala Val Lys 305 310 315 320		
Tyr Leu Thr Ala Gln Ile Val Leu Asp Ala Ile Asp Asp Leu Arg Ser 325 330 335		
Val Leu Gly Ala Gln Gly Tyr Leu Arg Gln Gly Pro Tyr Ala Met Phe 340 345 350		
Gln Lys Leu Val Arg Asp Ala Ala Pro Ala Ser Phe Ala His Val Ser 355 360 365		
Arg Ala Ala Cys Leu Val Met Leu Leu Pro His Leu Pro Arg Leu Ala 370 375 380		

Arg Arg Ser Trp Thr Ala Glu Glu Pro Pro Pro Asp Asn Val Phe Thr
 385 390 395 400
 Leu Gly Gly Glu Leu Ser Pro Leu Asp Phe Ser Arg Leu Val Ser Gly
 405 410 415
 Met Arg Gly Asp Pro Leu Ala Gly Val Leu His Asp Ser Trp His Asp
 420 425 430
 Glu Gly Pro Val Gly Arg Phe Ala Glu Arg Phe His Arg Glu Leu Thr
 435 440 445
 Gly Leu Arg Asp Ala Cys Arg Glu Leu Gly Pro Ala Asp Ile Thr Ile
 450 455 460
 Asp Ala Asn Pro Ala Ala Phe Ala Leu Ala Asp Arg Tyr Thr Val Leu 465
 470 475 480
 Leu Ala Ala Ala Cys Ala Leu Gly Val Trp Arg Ala Gly Gly Arg Leu
 485 490 495
 His Arg Pro Ala Leu Leu Ala Val Leu Asp Gly Leu Ala Gly Arg Leu
 500 505 510
 Gly Gly Glu Ala Val Leu Ser Val Ala Glu Arg Glu His Val Glu His
 515 520 525
 Gln Leu Phe Glu Met Ala Ala Asp Arg Val Arg Thr Ser Arg Leu Leu
 530 535 540
 Asp Leu Ser Ala Arg Gln Leu Pro Gly
 545 550
 <210> 26
 <211> 585
 <212> PRT
 <213> Actinoplanes sp.
 <400> 26
 Met Thr Val Arg Pro Leu Ala Pro Pro Ala Glu Val Arg Leu Asp Asp
 1 5 10 15
 Leu Leu Gly Pro Glu Asp Ala Trp Asp Ala Glu Thr Ala Ala Arg Asp
 20 25 30
 Ile Ala Glu Glu Phe Pro Ala Arg Leu His Asp Arg Leu Asn Ser Phe
 35 40 45
 Gly Leu Gln Ser Trp Tyr Val Pro Pro Glu Trp Gly Gly Ala Pro Gly
 50 55 60
 Asp His Glu Arg Leu Leu His Leu Trp Arg Ala Val Ala Arg Arg Asp
 65 70 75 80
 Leu Ser Ala Ala Val Ala His Gly Lys Thr Tyr Leu Gly Ser Ala Pro
 85 90 95
 Val Trp Leu Ala Gly Asp Asp Gly Gln Arg Ala Thr Leu Ala Ala Ala
 100 105 110

Val Leu Ala Gly Thr Pro Val Ala Trp Ala Leu Ser Glu Pro Asp His
115 120 125
Gly Ala Asp Leu Leu His Gly Thr Thr Thr Ala Leu Pro His Asp Ala
130 135 140
Gly Tyr Arg Leu Arg Gly Leu Lys Trp Pro Ile Asn Asn Ala Thr Arg
145 150 155 160
Ala Arg Tyr Leu Thr Val Leu Ala Arg Thr Gly Arg Ala Gly Asp Ala
165 170 175
Arg Gly Gln Ser Leu Phe Leu Val Asp Lys Glu Ala Leu Ala Pro Gly
180 185 190
Thr Trp Leu Pro Arg Pro Lys Val Ala Thr His Gly Val Arg Gly Ile
195 200 205
Asp Ile Ser Gly Ile Ala Phe Glu Asp Ala Gly Leu Pro Gly Thr Ala
210 215 220
Leu Leu Gly Arg Ala Gly Ser Gly Leu Glu Thr Val Leu Arg Ser Leu
225 230 235 240
Gln Leu Thr Arg Thr Met Cys Ala Gly Leu Ser Leu Gly Ala Gly Asp
245 250 255
Arg Ala Leu Arg Leu Thr Ala Arg Phe Val Ala Gln Arg Met Ile Met
260 265 270
Arg Arg Pro Leu Leu Asp Arg Gly His Pro Ala Gly Ile Leu Ala Arg
275 280 285
Cys Ala Ala Leu Leu Ala Ala Ala Glu Ala Thr Ala Val Val Gly Thr
290 295 300
Arg Ser Val His Ser Leu Thr Ala Glu Met Ser Val Thr Ser Ala Ile
305 310 315 320
Val Lys Ala Tyr Val Pro Thr Val Val Asp Arg Val Leu Arg Glu Leu
325 330 335
Ala Glu Leu Leu Gly Ser Arg Ser Phe Leu Arg Asp Glu Tyr Glu His
340 345 350
Gly Met Phe Pro Lys Leu Val Arg Asp His His Val Val Ala Val Phe
355 360 365
Asp Gly Ser Thr Pro Val Val Arg Thr Ala Leu Ala His Gln Phe Pro
370 375 380
Arg Leu Ala Ala Gly Phe Ala Ala Gly Ala Val Ser Ala Glu Gly Leu
385 390 395 400
Ala Glu Ala Ser Ala Ala Gly Gln Pro Pro Pro Pro Leu Asp Arg Gly
405 410 415
Ala Leu Thr Leu Leu Ser Arg His Gly Cys Ser Val Val Gln Ala Leu
420 425 430

Pro Ala Leu Ala Val Ser Ala Ala Val Arg Gly Gly Pro Ala Gly Leu
 435 440 445
 Ala Arg His Ala Ala Ala Leu Ala Gly Glu Ala Arg Arg Ile Cys Gly
 450 455 460
 Gln Met Thr Glu Leu Gly Pro Ser Ala Arg Pro Ser Met Val Gly His
 465 470 475 480
 Glu Leu Ala Ala Ala Tyr Glu Trp Cys Tyr Ala Gly Ala Ala Cys Leu
 485 490 495
 Leu Leu Trp Thr Ser Ala Glu Gly Arg His Thr Ala Asp Pro Leu Trp
 500 505 510
 Ala Asp Gly Leu Trp Val Leu Ala Ala Leu Arg Ala Val Arg Arg Glu
 515 520 525
 Leu Ala Arg Val Leu Arg Ala Pro Ala Pro Asp Pro Gly Pro His Asp
 530 535 540
 Asp Gly Ala Asp Arg Leu Leu Ala Ala Arg Val Ala Ala Ala Ala Arg
 545 550 555 560
 Thr Gly Glu Pro Val Thr Pro Phe Gly Thr Ala Leu Arg Pro Pro Ala
 565 570 575
 Gly Thr Val Arg Ala Glu Asp Gly Arg
 580 585
 <210> 27
 <211> 587
 <212> PRT
 <213> Actinoplanes sp.
 <400> 27
 Met Val Ile Asp Ala Ala Thr Gln Pro Thr Val Pro Asp Ala Phe Arg
 1 5 10 15
 Ala Gln Ala Ile Ala Arg Pro Gly Glu Pro Ala Leu Val Val Leu Pro
 20 25 30
 Gly Asp Pro Asp Ala Glu Pro Val Thr Leu Thr Tyr Ala Glu Leu Asp
 35 40 45
 Arg Arg Ala Ala Ala Arg Ala Ala Trp Leu Ala Ala Arg Phe Pro Ala
 50 55 60
 Gly Glu Arg Ile Leu Ile Ala Leu Pro Thr Gly Ala Glu Phe Val Glu
 65 70 75 80
 Leu Tyr Leu Ala Cys Leu Tyr Ala Gly Leu Val Ala Val Pro Ala Pro
 85 90 95
 Pro Pro Gly Gly Ser Ser Gly Ala Ser Glu Arg Thr Val Gly Ile Ala
 100 105 110
 Ala Asp Cys Ser Pro Ala Leu Ala Val Val Asn Ala Asp Asp Ala Ala
 115 120 125
 Pro Leu Thr Ala Val Leu Arg Glu Arg Gly Leu Ser Gly Leu Pro Val

130	135	140
Gly Ala Leu Pro Pro Leu Ala Ala Glu Ala Ile Arg Pro Pro Arg Gly 145 150 155 160		
Pro Arg Pro Asp Ser Leu Ala Val Leu Gln Tyr Ser Ser Gly Ser Thr 165 170 175		
Gly Ser Pro Lys Gly Val Met Leu Ser His Arg Ala Val Leu Ala Asn 180 185 190		
Leu Arg Ala Phe Asp Arg Ser Ser Gly His Asn Ser Asp Asp Val Phe 195 200 205		
Gly Ser Trp Leu Pro Leu His His Asp Met Gly Leu Phe Ala Met Leu 210 215 220		
Thr Ala Gly Leu Leu Asn Gly Ala Gly Val Val Leu Met Ser Pro Thr 225 230 235 240		
Ala Phe Val Arg Arg Pro Ala Asp Trp Leu Arg Met Met Asp Arg Tyr 245 250 255		
Arg Val Thr Ile Ser Ala Ala Pro Asn Phe Ala Tyr Asp Leu Cys Val 260 265 270		
Arg Ala Val Arg Asp Glu Gln Ile Ala Gly Leu Asp Leu Ser Arg Ile 275 280 285		
Arg Thr Leu Tyr Asn Gly Ser Glu Pro Val Asn Pro Ala Thr Val Arg 290 295 300		
Ala Phe Thr Glu Arg Phe Ala Pro Phe Gly Leu His Thr His Ala Val 305 310 315 320		
Asn Pro Cys Tyr Gly Met Ala Glu Phe Thr Ala Tyr Val Ser Thr Lys 325 330 335		
Val Phe Glu Ala Pro Ala Val Phe Leu Pro Ala Asp Pro Arg Ala Leu 340 345 350		
Glu Asp Ala Ala Ser Pro Ala Leu Arg Pro Ala Asp Pro Ala Ala Ala 355 360 365		
Arg Glu Ile Pro Gly Val Gly Arg Val Pro Asp Phe Glu Val Leu Ile 370 375 380		
Val Asp Pro Asp Gly Leu Arg Pro Leu Pro Glu Gly Arg Val Gly Glu 385 390 395 400		
Ile Trp Leu Arg Gly Pro Gly Ala Gly Ala Gly Tyr Trp Gly Arg Thr 405 410 415		
Glu Leu Asn Pro Gly Ile Phe Asp Ala Arg Pro Ala Gly Asp Gly Gln 420 425 430		
Asp Gly Gly Trp Val Arg Thr Gly Asp Leu Gly Ala Leu Thr Gly Gly 435 440 445		
Glu Leu Phe Leu Thr Gly Arg Leu Lys Glu Leu Leu Ile Val His Gly 450 455 460		

Arg Asn Leu Ala Pro His Asp Leu Glu Arg Glu Ala Arg Ala Ala His
465 470 475 480

Asp Ala Val Asp His Gln Ile Gly Ala Ala Phe Gly Val Pro Ala Pro
485 490 495

Asp Glu Arg Ile Val Leu Val Gln Glu Val His Pro Arg Thr Pro Leu
500 505 510

Asp Glu Leu Pro Arg Val Ala Ser Ala Val Ser Arg Arg Leu Thr Val
515 520 525

Ser Phe Gly Val Pro Val Arg Asn Val Leu Leu Val Arg Arg Gly Thr
530 535 540

Val Arg Arg Thr Thr Ser Gly Lys Ile Arg Arg Thr Ala Val Arg Glu
545 550 555 560

Arg Phe Leu Ala Gly Gly Ile Thr Ala Leu His Ala Glu Leu Glu Pro
565 570 575

Ala Leu Arg Pro Val Gln Ala Gly Ala Gly Arg
580 585

<210> 28

<211> 75

<212> PRT

<213> Actinoplanes sp.

<220>

<221> misc_feature

<222> (1)..(1)

<223> V represents a non-standard initiator codon. Ti is expected that
the biosynthesized protein will have a formylmethionine residue
at this position

<400> 28

Val Pro Asn Pro Phe Glu Asp Pro Asp Ala Asn Tyr Leu Val Leu Val
1 5 10 15

Asn Asp Glu Gly Gln His Ser Leu Trp Pro Val Phe Ala Asp Val Pro
20 25 30

Asp Gly Trp Thr Thr Val Phe Gly Glu Ala Gly Arg Gln Asp Cys Leu
35 40 45

Asp Tyr Ile Glu Lys Ser Trp Thr Asp Met Arg Pro Lys Ser Leu Ile
50 55 60

Ala Ala Met Glu Lys Gln Lys Gln Pro Gln Ser
65 70 75

<210> 29

<211> 94

<212> PRT

<213> Actinoplanes sp.

<220>

<221> misc_feature

<222> (1)..(1)

<223> V is a non-standard initiator codon. It is expected that the biosynthesized protein will have a formylmethionine residue at this position

<400> 29

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Val Ala Pro Gly Ala Pro Pro Ala Glu His Gly Glu Ala Val Pro Glu
1          5          10          15
Ala Asp Ile Pro Val Leu Arg Asn Arg Ile Asp Glu Ile Asp Ala Ala
20          25          30
Ile Met Arg Leu Trp Gln Glu Arg Ala Ser Ile Ser Gln Lys Ile Gly
35          40          45
Ser Ile Arg Leu Ala Ser Gly Gly Thr Arg Val Val Leu Ser Arg Glu
50          55          60
Gln Glu Val Ile Gln Arg Phe Arg Ala Ala Leu Gly Glu Asp Gly Thr
65          70          75          80
Thr Ile Ala Leu Met Leu Leu Arg Ala Gly Arg Gly Pro Leu
85          90
```

<210> 30

<211> 619

<212> PRT

<213> Actinoplanes sp.

<220>

<221> misc_feature

<222> (1)..(1)

<223> V represents a non-standard initiator codon. It is expected that the biosynthesized protein will have a formylmethionine residue at this position

<400> 30

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Val Asp Val Pro Arg Val Arg Pro Pro Gly Ala Ala Pro Ala Pro Arg
1          5          10          15
Arg Arg Arg Trp Arg Phe Trp Gln Ser Pro Asp Gly Gln Pro Ala Trp
20          25          30
Ala Arg Pro Ala Leu Leu Gly Ile Ala Ala Leu Ala Ala Val Leu Tyr
35          40          45
Thr Ala Asn Leu Ala Arg Ser Gly Tyr Pro Met Tyr Tyr Ala Val Ala
50          55          60
Val Lys Ser Met Ser Val Ser Trp Pro Ala Phe Trp Thr Gly Ala Phe
65          70          75          80
Asp Pro Ala Ala Ser Ile Thr Ile Asp Lys Leu Ala Gly Ala Phe Val
85          90          95
Pro Gln Ala Leu Ser Ala Arg Val Phe Gly Phe His Gln Trp Ser Leu
100         105         110
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Ala Leu Pro Gln Ala Val Glu Gly Val Ile Ala Val Leu Val Leu Tyr
 115 120 125
 Arg Ala Val Arg Arg Trp His Gly Pro Gly Ala Gly Leu Ala Ala Ala
 130 135 140
 Gly Leu Phe Ala Thr Thr Pro Ile Val Ser Ser Met Phe Gly His Ser
 145 150 155 160
 Met Glu Asp Gly Ala Leu Thr Leu Cys Leu Val Leu Ala Ala Asp Ala
 165 170 175
 Phe Gly Ala Ala Val Thr Arg Gly Ser Pro Ala Arg Leu Ala Leu Ala
 180 185 190
 Gly Ala Trp Ile Gly Leu Gly Phe Gln Ala Lys Met Met Gln Ala Trp
 195 200 205
 Leu Val Leu Pro Ala Leu Val Val Thr Tyr Leu Ala Gly Ala Pro Val
 210 215 220
 Arg Ala Arg Ala Arg Val Val His Val Ala Ala Val Ala Ala Thr
 225 230 235 240
 Leu Ala Val Ser Leu Leu Trp Val Leu Ala Leu Thr Leu Leu Pro Gly
 245 250 255
 Ser His Arg Pro Trp Ala Asp Gly Thr Thr Ser Gly Asn Ala Phe Ala
 260 265 270
 Met Val Phe Gly Tyr Asn Gly Phe Asp Arg Ala Gly Ile His Val Pro
 275 280 285
 Gly Ala Leu Thr Thr Gly Phe Thr Asp Gly Gly Ala Ala Ala Gly Gly
 290 295 300
 Ser Trp Thr Ala Leu Ala Ala Asp Arg Leu Ala Thr Gln Ile Gly Trp
 305 310 315 320
 Trp Tyr Pro Leu Ala Leu Thr Gly Leu Leu Leu Gly Leu Ala Arg Trp
 325 330 335
 Arg Thr Ala Arg Ala Gly Leu Leu Phe Trp Gly Leu Trp Leu Leu Thr
 340 345 350
 Ala Ala Val Val Leu Ser Arg Ile Thr Ile Gln His Asn Ala Tyr Leu
 355 360 365
 Ala Val Leu Ala Pro Pro Leu Ala Ala Leu Ala Ala Gly Ala Val
 370 375 380
 Gln Leu Trp Arg Thr His Arg Asp Gly Thr Ala Pro Trp Leu Leu Pro
 385 390 395 400
 Ala Val Val Val Val Gln Ala Gly Trp Thr Leu Trp Leu Ala Thr Arg
 405 410 415
 Tyr Pro Ser Phe Leu Ala Gly Leu Thr Trp Thr Ala Pro Ile Ala Ala
 420 425 430

Val Leu Ala Val Val Val Leu Ala Ala Arg Pro Thr Ala Arg Arg Pro
 435 440 445
 Ala Val Val Val Val Val Ala Gly Leu Leu Ala Val Pro Val Ala Trp
 450 455 460
 Gly Ala Ser Val Leu Asn Pro Arg Tyr Ala Gly Thr Ser Phe Glu Ala
 465 470 475 480
 Gly Ala Gly Pro Ser Gly Pro Val Gly Val Arg Leu Asp Asp Asp Thr
 485 490 495
 Thr Asp Arg Leu Thr Pro Gly Leu Arg Arg Leu Asp Asp Tyr Leu Ala
 500 505 510
 Ala His Arg Asp Gly Arg Thr Tyr Leu Ala Ala Thr Ser Ser Trp Arg
 515 520 525
 Thr Ala Gly Arg Leu Ile Val Pro Thr Gly His Ser Tyr Leu Pro Leu
 530 535 540
 Gly Gly Phe Ser Gly Ala Ala Pro Phe Pro Ser Leu Ala Gly Val Gln
 545 550 555 560
 Arg Leu Val Arg Asp Gly Glu Leu Arg Tyr Phe Val Leu Gly Gly Pro
 565 570 575
 Glu Gly Leu Gly Gly Glu Ala Thr Glu Ala Tyr Arg Ile Thr Gly Trp
 580 585 590
 Val Leu Glu Thr Cys Ala Thr Val Pro Pro Ala Glu His Gly Ala Asp
 595 600 605
 Pro Asp Leu Thr Val Leu Arg Cys Asp Lys Pro
 610 615

<210> 31
 <211> 355
 <212> PRT
 <213> Actinoplanes sp.
 <220>
 <221> misc_feature
 <222> (1)..(1)
 <223> V represents a non-standard initiator codon. It is expected that
 the biosynthesized protein will have a formylmethionine residue a
 t this position

<400> 31

Val Asp Asn Gly Thr Phe Thr Asp Leu Arg Ile Asp His Ile Glu Phe
 1 5 10 15
 Ala Val Ala Asp Val Glu Ser Ala Ser Ala Pro Phe Thr Glu Gly Tyr
 20 25 30
 Gly Phe Ser Val Tyr Gly Gly Thr Gly Asp Ala His Ala Pro Val Arg
 35 40 45
 Arg Val Ala Leu Gly Arg Asp Asp Ile Arg Leu Val Leu Thr Ala Ala
 50 55 60

Pro Gly Gly Asp His Pro Ala Met Ala Tyr Val Glu Gln His Gly Asp
 65 70 75 80
 Gly Val Ser Ala Ile Ala Leu Ser Thr Arg Asp Ala His Ala Ala Phe
 85 90 95
 Thr Glu Ala Val Arg Arg Gly Ala Val Gly Val Ser Ala Pro Val Thr
 100 105 110
 Gly Asn Gly Val Thr Val Ala Thr Ile Arg Gly Phe Gly Asp Val Leu
 115 120 125
 His Thr Phe Val Glu Arg Ala Pro Gly Ala Asp Pro Arg Thr Leu Pro
 130 135 140
 Gly Leu Glu Leu Arg Arg Pro Ser Pro Thr Arg Phe Asp Ser Gly Leu
 145 150 155 160
 Gln Ala Ile Asp His Ile Ala Val Cys Leu Glu Pro Gly Thr Leu Asp
 165 170 175
 Pro Thr Val Asp Phe Tyr Arg Asp Val Leu Asp Phe Glu Met Ile Phe
 180 185 190
 Glu Glu Arg Ile Leu Val Gly Arg Gln Ala Met Asp Ser Lys Val Val
 195 200 205
 Gln Ser Arg Ser Gly Gly Val Thr Leu Thr Leu Ile Glu Pro Asp Thr
 210 215 220
 Ser Leu Glu Gln Gly Gln Ile Asp Thr Phe Leu Lys Asn His Gly Gly
 225 230 235 240
 Pro Gly Val Gln His Leu Ala Phe Ile Thr Asp Asp Val Leu Arg Ser
 245 250 255
 Val Gly Arg Met Ser Glu His Gly Val Glu Phe Leu His Thr Pro Asp
 260 265 270
 Ser Tyr Tyr Gly Arg Leu Pro Gly Arg Ile Pro Gln Ala Gly His Pro
 275 280 285
 Ile Gln Ala Leu Arg Asp Leu Asn Val Leu Val Asp Gln Asp His Asp
 290 295 300
 Gly Gln Leu Phe Gln Ile Phe Thr Lys Ser Val His Pro Arg Gly Thr
 305 310 315 320
 Ile Phe Met Glu Val Ile Glu Arg Met Gly Ala Arg Ser Phe Gly Ser
 325 330 335
 Gly Asn Ile Lys Ala Leu Tyr Glu Ala Val Glu Leu Asp Met Ser Lys
 340 345 350
 Gln Ser Ala
 355

<210> 32
 <211> 429
 <212> PRT

<213> Actinoplanes sp.

<400> 32

Met	Glu	Ser	Pro	Ala	Thr	His	Ala	Glu	Leu	Val	Ile	Gly	Thr	Val	Leu	
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Leu	Asp	Ile	Ala	Leu	Val	Leu	Ala	Ala	Gly	Ala	Leu	Leu	Gly	Arg	Trp	
			20					25					30			
Val	Arg	Arg	Leu	Arg	Gln	Pro	Ala	Val	Ile	Gly	Glu	Ile	Leu	Ala	Gly	
		35					40					45				
Ile	Ala	Leu	Gly	Pro	Ser	Leu	Leu	Gly	Leu	Leu	Pro	Gly	Asn	Pro	Thr	
	50					55					60					
Ala	Trp	Leu	Phe	Pro	Ala	Glu	Ala	Arg	Pro	Tyr	Leu	Ser	Ala	Val	Ala	
65					70					75					80	
Gln	Ile	Gly	Leu	Ala	Leu	Phe	Thr	Phe	Leu	Ile	Gly	Trp	Glu	Phe	Asn	
			85					90						95		
Pro	Ala	Thr	Leu	Ala	Arg	His	Arg	Gly	Thr	Ala	Ala	Ala	Val	Ser	Ile	
			100					105					110			
Gly	Ser	Ile	Ala	Val	Ser	Phe	Gly	Leu	Gly	Ile	Ala	Leu	Ala	Thr	Val	
		115					120					125				
Leu	His	Pro	Arg	His	Asp	Thr	Thr	Gly	Gly	Gly	Lys	Val	Gly	Phe	Thr	
	130					135					140					
Glu	Phe	Ala	Leu	Phe	Leu	Gly	Val	Ala	Met	Ser	Ile	Thr	Ala	Phe	Pro	
145					150					155					160	
Val	Leu	Ala	Arg	Ile	Leu	Ala	Glu	Arg	Arg	Leu	Thr	Gly	Thr	Arg	Val	
			165					170						175		
Gly	Ser	Ile	Ala	Leu	Val	Ser	Ala	Ala	Ile	Asp	Asp	Val	Val	Ala	Trp	
		180						185					190			
Cys	Leu	Leu	Ala	Leu	Val	Thr	Ala	Ile	Ala	Thr	Ala	Ser	Gly	Pro	Val	
	195						200					205				
Gln	Leu	Val	Arg	Ile	Leu	Ala	Leu	Leu	Ala	Val	Phe	Leu	Val	Val	Leu	
	210					215					220					
Val	Thr	Val	Val	Arg	Pro	Leu	Leu	Val	Leu	Leu	Ala	Arg	Arg	Pro	Ser	
225					230					235					240	
Ala	Ser	Tyr	Leu	Leu	Val	Ala	Val	Val	Ala	Val	Val	Leu	Leu	Ser	Ala	
			245						250					255		
Tyr	Ala	Thr	Thr	Trp	Ile	Gly	Leu	His	Ala	Ile	Phe	Gly	Ala	Phe	Cys	
		260						265					270			
Ala	Gly	Leu	Val	Met	Pro	Arg	Glu	Pro	Ala	Ala	Ala	Leu	Arg	Glu	Arg	
		275					280					285				
Val	Arg	Gln	Pro	Leu	Glu	His	Val	Ser	Val	Val	Leu	Leu	Pro	Val	Phe	
	290					295					300					

Phe Ile Val Thr Gly Leu Gly Val Asp Ile Gly Ala Leu Thr Ala Ala
 305 310 315 320

Asn Ile Leu Glu Leu Ala Ala Ile Ile Val Ile Ala Cys Ala Gly Lys
 325 330 335

Leu Ala Gly Ala Ile Val Pro Ala Val Ser Leu Gly Met Ser Trp Arg
 340 345 350

Asp Ala Arg Thr Leu Gly Leu Leu Val Asn Thr Arg Gly Leu Thr Glu
 355 360 365

Leu Val Val Leu Asn Val Gly Leu Gln Leu Ala Val Leu Asp Gly Gln
 370 375 380

Met Phe Thr Met Met Val Leu Met Ala Leu Val Thr Thr Ala Leu Ala
 385 390 395 400

Gly Pro Leu Ile Gly Ser Ala Arg Thr Pro Ala Ala Gly Ala Pro Ala
 405 410 415

Gln Ala Leu Pro Ala Glu Pro Arg Thr Arg Arg Ala Ala
 420 425

<210> 33

<211> 189

<212> PRT

<213> Actinoplanes sp.

<220>

<221> misc_feature

<222> (1)..(1)

<223> V represents a non-standard initiator codon. It is expected that
 the biosynthesized protein will have a formylmethionine residue
 at this position

<400> 33

Val Ser Asp Glu Ala Ala Val Pro Ser Pro Ala Arg Leu Leu Arg Asp
 1 5 10 15

Phe Val Asn Thr Tyr Glu Pro Gln Val Asp Asp Glu Ser Leu Ser Thr
 20 25 30

Pro Asp Ala Leu Arg Ala Trp Leu Ala Gly Glu Ser Leu Leu Ala Pro
 35 40 45

Gly Ala Arg Val Arg Pro Ala Asp Leu Ala Arg Ala Val Ala Leu Arg
 50 55 60

Glu Gly Leu Arg Gln Val Leu Leu Gly His Ala Gly His Pro Ala Asp
 65 70 75 80

Pro Ala Ala Leu Arg Arg Leu Glu Glu Ile Leu Ala Ala Val Pro Val
 85 90 95

Arg Leu Ser Leu Ala Gly Gly Ala Pro Arg Leu Leu Pro Ala Gly Gly
 100 105 110

Thr Pro Phe Asp Arg Ala Leu Ala Gly Leu Ile Asp Ala Val Arg Gln

115 120 125
 Cys Ala Glu Leu Gln Val Trp Thr Arg Leu Lys Val Cys Asp Arg Asp
 130 135 140
 Thr Cys Arg Trp Ala Tyr Tyr Asp Ala Ser Arg Asn Gln Ala Arg Arg
 145 150 155 160
 Trp Cys Ser Met Ala Gly Cys Gly Asn Tyr Ile Lys Met Arg Arg Ala
 165 170 175
 Tyr Ala Ala Arg Arg Val Arg Gly Ser Ala Gly Ser Ala
 180 185

<210> 34
 <211> 309
 <212> PRT
 <213> Actinoplanes sp.

<220>
 <221> misc_feature
 <222> (1)..(1)<223> V represents a non-standard initiator codon. It is
 expected that
 the biosynthesized protein will have a formylmethionine residue
 at this position

<400> 34

Val Ala Thr Thr Leu Arg Asp Val Ala Arg Leu Ala Arg Val Ser Val
 1 5 10 15
 Lys Thr Val Ser Asn Val Val Asn Asp His Pro His Val Ser Asp Asp
 20 25 30
 Val Arg Arg Arg Val Glu Thr Ala Ile Arg Gln Leu Gly Tyr Arg Pro
 35 40 45
 Asn Leu Val Ala Arg Ala Leu Arg Ser Gly Arg Gly Ser Gly Leu Leu
 50 55 60
 Ala Leu Ala Met Pro Gly Ala Gly Ala Pro Gln Ser Pro Ala Leu Ile
 65 70 75 80
 Glu Glu Ile Ile Arg Arg Ala Ala Pro Leu Gly Phe Arg Val Leu Ile
 85 90 95
 Glu Pro Leu Glu Ser Ser Arg Pro Arg Pro Pro Ala Pro Gly Val Asp
 100 105 110
 Ala Arg Leu Leu Asn Ala Glu Ala Pro Ala Pro Glu Leu Val Asp Ala
 115 120 125
 Gln Ala Ala Thr Gly Thr Pro Leu Val Leu Leu Thr Gly Thr Pro Asp
 130 135 140
 Pro Arg Tyr Asp Cys Val Gly Pro Asp Ala Ala Arg Ala Ala Glu Asp
 145 150 155 160
 Ala Val Asp His Leu Arg Arg Leu Gly Arg Arg Arg Val Ala Thr Ile
 165 170 175

Gly Gly Ser Leu Ser Thr Gly Pro Ala Gly Ser Gly Ser Asp Phe Gly
 180 185 190
 Ser Gly Ser Gly Ser Gly Ser Gly Ser Gly Ser Gly Ser Gly Ser Gly
 195 200 205
 Ser Gly Ser Gly Ser Gly Ser Gly Ser Gly Ser Gly Phe Gly Ser Gly
 210 215 220
 Ser Gly Phe Gly Ser Gly Ser Ala Glu Gly Tyr Arg Ala Ala Arg Gln
 225 230 235 240
 Leu Leu Gly His Glu Asp Arg Pro Asp Ala Ile Val Cys Gly Ser Val
 245 250 255
 Arg Leu Ala Val Gly Val Ile Arg Ala Ala Ala Asp Ala Gly Leu Arg
 260 265 270
 Val Pro Glu Asp Val Ala Val Ile Gly Ile Gly Asp Gly Glu Glu Gly
 275 280 285
 Arg Tyr Thr Arg Pro Ala Leu Thr Thr Val Ala Thr Asp Pro Ala Phe
 290 295 300
 Ile Ala Gly Lys Ala
 305

<210> 35
 <211> 542
 <212> PRT
 <213> Bacillus brevis

<400> 35

Met Leu Asn Ser Ser Lys Ser Ile Leu Ile His Ala Gln Asn Lys Asn
 1 5 10 15
 Gly Thr His Glu Glu Glu Gln Tyr Leu Phe Ala Val Asn Asn Thr Lys
 20 25 30
 Ala Glu Tyr Pro Arg Asp Lys Thr Ile His Gln Leu Phe Glu Glu Gln
 35 40 45
 Val Ser Lys Arg Pro Asn Asn Val Ala Ile Val Cys Glu Asn Glu Gln
 50 55 60
 Leu Thr Tyr His Glu Leu Asn Val Lys Ala Asn Gln Leu Ala Arg Ile
 65 70 75 80
 Phe Ile Glu Lys Gly Ile Gly Lys Asp Thr Leu Val Gly Ile Met Met
 85 90 95
 Glu Lys Ser Ile Asp Leu Phe Ile Gly Ile Leu Ala Val Leu Lys Ala
 100 105 110
 Gly Gly Ala Tyr Val Pro Ile Asp Ile Glu Tyr Pro Lys Glu Arg Ile
 115 120 125
 Gln Tyr Ile Leu Asp Asp Ser Gln Ala Arg Met Leu Leu Thr Gln Lys
 130 135 140

His Leu Val His Leu Ile His Asn Ile Gln Phe Asn Gly Gln Val Glu
 145 150 155 160
 Ile Phe Glu Glu Asp Thr Ile Lys Ile Arg Glu Gly Thr Asn Leu His
 165 170 175
 Val Pro Ser Lys Ser Thr Asp Leu Ala Tyr Val Ile Tyr Thr Ser Gly
 180 185 190
 Thr Thr Gly Asn Pro Lys Gly Thr Met Leu Glu His Lys Gly Ile Ser
 195 200 205
 Asn Leu Lys Val Phe Phe Glu Asn Ser Leu Asn Val Thr Glu Lys Asp
 210 215 220
 Arg Ile Gly Gln Phe Ala Ser Ile Ser Phe Asp Ala Ser Val Trp Glu
 225 230 235 240
 Met Phe Met Ala Leu Leu Thr Gly Ala Ser Leu Tyr Ile Ile Leu Lys
 245 250 255
 Asp Thr Ile Asn Asp Phe Val Lys Phe Glu Gln Tyr Ile Asn Gln Lys
 260 265 270
 Glu Ile Thr Val Ile Thr Leu Pro Pro Thr Tyr Val Val His Leu Asp
 275 280 285
 Pro Glu Arg Ile Leu Ser Ile Gln Thr Leu Ile Thr Ala Gly Ser Ala
 290 295 300
 Thr Ser Pro Ser Leu Val Asn Lys Trp Lys Glu Lys Val Thr Tyr Ile
 305 310 315 320
 Asn Ala Tyr Gly Pro Thr Glu Thr Thr Ile Cys Ala Thr Thr Trp Val
 325 330 335
 Ala Thr Lys Glu Thr Ile Gly His Ser Val Pro Ile Gly Ala Pro Ile
 340 345 350
 Gln Asn Thr Gln Ile Tyr Ile Val Asp Glu Asn Leu Gln Leu Lys Ser
 355 360 365
 Val Gly Glu Ala Gly Glu Leu Cys Ile Gly Gly Glu Gly Leu Ala Arg
 370 375 380
 Gly Tyr Trp Lys Arg Pro Glu Leu Thr Ser Gln Lys Phe Val Asp Asn 385
 390 395 400
 Pro Phe Val Pro Gly Glu Lys Leu Tyr Lys Thr Gly Asp Gln Ala Arg
 405 410 415
 Trp Leu Ser Asp Gly Asn Ile Glu Tyr Leu Gly Arg Ile Asp Asn Gln
 420 425 430
 Val Lys Ile Arg Gly His Arg Val Glu Leu Glu Glu Val Glu Ser Ile
 435 440 445
 Leu Leu Lys His Met Tyr Ile Ser Glu Thr Ala Val Ser Val His Lys
 450 455 460

Asp His Gln Glu Gln Pro Tyr Leu Cys Ala Tyr Phe Val Ser Glu Lys
465 470 475 480

His Ile Pro Leu Glu Gln Leu Arg Gln Phe Ser Ser Glu Glu Leu Pro
485 490 495

Thr Tyr Met Ile Pro Ser Tyr Phe Ile Gln Leu Asp Lys Met Pro Leu
500 505 510

Thr Ser Asn Gly Lys Ile Asp Arg Lys Gln Leu Pro Glu Pro Asp Leu
515 520 525

Thr Phe Gly Met Arg Val Asp Tyr Glu Ala Pro Arg Asn Glu
530 535 540

<210> 36

<211> 582

<212> PRT

<213> Mycobacterium bovis

<400> 36

Met Ala Met Ser Val Arg Ser Leu Pro Ala Ala Leu Arg Ala Cys Ala
1 5 10 15

Cys Leu Gln Pro His Asp Pro Ala Phe Thr Phe Met Asp Tyr Glu Gln
20 25 30

Asp Trp Asp Gly Val Ala Ile Thr Leu Thr Trp Ser Gln Leu Tyr Arg
35 40 45

Arg Thr Leu Asn Val Ala Arg Glu Leu Ser Arg Cys Gly Ser Thr Gly
50 55 60

Asp Arg Val Val Ile Ser Ala Pro Gln Gly Leu Glu Tyr Val Val Ala
65 70 75 80

Phe Leu Gly Ala Leu Gln Ala Gly Arg Ile Ala Val Pro Leu Ser Val
85 90 95

Pro Gln Gly Gly Val Thr Asp Glu Arg Ser Asp Ser Val Leu Ser Asp
100 105 110

Ser Ser Pro Val Ala Ile Leu Thr Thr Ser Ser Ala Val Asp Asp Val
115 120 125

Val Gln His Val Ala Arg Arg Pro Gly Glu Ser Pro Pro Ser Ile Ile
130 135 140

Glu Val Asp Leu Leu Asp Leu Asp Ala Pro Asn Gly Tyr Thr Phe Lys
145 150 155 160

Glu Asp Glu Tyr Pro Ser Thr Ala Tyr Leu Gln Tyr Thr Ser Gly Ser
165 170 175

Thr Arg Thr Pro Ala Gly Val Val Met Ser His Gln Asn Val Arg Val
180 185 190

Asn Phe Glu Gln Leu Met Ser Gly Tyr Phe Ala Asp Thr Asp Gly Ile
195 200 205

Pro Pro Pro Asn Ser Ala Leu Val Ser Trp Leu Pro Phe Tyr His Asp
 210 215 220
 Met Gly Leu Val Ile Gly Ile Cys Ala Pro Ile Leu Gly Gly Tyr Pro
 225 230 235 240
 Ala Val Leu Thr Ser Pro Val Ser Phe Leu Gln Arg Pro Ala Arg Trp
 245 250 255
 Met His Leu Met Ala Ser Asp Phe His Ala Phe Ser Ala Ala Pro Asn
 260 265 270
 Phe Ala Phe Glu Leu Ala Ala Arg Arg Thr Thr Asp Asp Asp Met Ala
 275 280 285
 Gly Arg Asp Leu Gly Asn Ile Leu Thr Ile Leu Ser Gly Ser Glu Arg
 290 295 300
 Val Gln Ala Ala Thr Ile Lys Arg Phe Ala Asp Arg Phe Ala Arg Phe
 305 310 315 320
 Asn Leu Gln Glu Arg Val Ile Arg Pro Ser Tyr Gly Leu Ala Glu Ala
 325 330 335
 Thr Val Tyr Val Ala Thr Ser Lys Pro Gly Gln Pro Pro Glu Thr Val
 340 345 350
 Asp Phe Asp Thr Glu Ser Leu Ser Ala Gly His Ala Lys Pro Cys Ala
 355 360 365
 Gly Gly Gly Ala Thr Ser Leu Ile Ser Tyr Met Leu Pro Arg Ser Pro
 370 375 380
 Ile Val Arg Ile Val Asp Ser Asp Thr Cys Ile Glu Cys Pro Asp Gly
 385 390 395 400
 Thr Val Gly Glu Ile Trp Val His Gly Asp Asn Val Gly Asn Gly Tyr
 405 410 415
 Trp Gln Lys Pro Asp Glu Ser Glu Arg Thr Phe Gly Gly Lys Ile Val
 420 425 430
 Thr Pro Ser Pro Gly Thr Pro Glu Gly Pro Trp Leu Arg Thr Gly Asp
 435 440 445
 Ser Gly Phe Val Thr Asp Gly Lys Met Phe Ile Ile Gly Arg Ile Lys
 450 455 460
 Asp Leu Leu Ile Val Tyr Gly Arg Asn His Ser Pro Asp Asp Ile Glu
 465 470 475 480
 Glu Thr Ile Gln Glu Ile Thr Arg Gly Arg Cys Ala Ala Ile Ser Val
 485 490 495
 Pro Gly Asp Arg Arg Thr Glu Lys Leu Val Ala Ile Ile Glu Leu Lys
 500 505 510
 Lys Arg Gly Asp Ser Asp Gln Asp Ala Met Ala Arg Leu Gly Ala Ile
 515 520 525
 Lys Arg Glu Val Thr Ser Ala Leu Ser Ser Ser His Gly Leu Ser Val

530 535 540
 Ala Asp Leu Val Leu Val Ala Pro Gly Ser Ile Pro Ile Thr Thr Ser
 545 550 555 560
 Gly Lys Val Arg Arg Gly Ala Cys Val Glu Gln Tyr Arg Gln Asp Gln
 565 570 575
 Phe Ala Arg Leu Asp Ala
 580

 <210> 37
 <211> 619
 <212> PRT
 <213> Mycobacterium tuberculosis

 <400> 37

 Met Lys Thr Asn Ser Ser Phe His Ala Ala Gly Glu Val Ala Thr Gln
 1 5 10 15
 Pro Ala Trp Gly Thr Gly Glu Gln Ala Ala Gln Pro Leu Asn Gly Ser
 20 25 30
 Thr Ser Arg Phe Ala Met Ser Glu Ser Ser Leu Ala Asp Leu Leu Gln
 35 40 45
 Lys Ala Ala Ser Gln Tyr Pro Asn Arg Ala Ala Tyr Lys Phe Ile Asp
 50 55 60
 Tyr Asp Thr Asp Pro Ala Gly Phe Thr Glu Thr Val Thr Trp Trp Gln
 65 70 75 80
 Val His Arg Arg Ala Met Ile Val Ala Glu Glu Leu Trp Ile Tyr Ala
 85 90 95
 Ser Ser Gly Asp Arg Val Ala Ile Leu Ala Pro Gln Gly Leu Glu Tyr
 100 105 110
 Ile Ile Ala Phe Met Gly Val Leu Gln Ala Gly Leu Ile Ala Val Pro
 115 120 125
 Leu Pro Val Pro Gln Phe Gly Ile His Asp Glu Arg Ile Ser Ser Ala
 130 135 140
 Leu Arg Asp Ser Ala Pro Ser Ile Ile Leu Thr Thr Ser Ser Val Ile
 145 150 155 160
 Asp Glu Val Thr Thr Tyr Ala Pro His Ala Cys Ala Ala Gln Gly Gln
 165 170 175
 Ser Ala Pro Ile Val Val Ala Val Asp Ala Leu Asp Leu Ser Ser Ser
 180 185 190
 Arg Ala Leu Asp Pro Thr Arg Phe Glu Arg Pro Ser Thr Ala Tyr Leu
 195 200 205
 Gln Tyr Thr Ser Gly Ser Thr Arg Ala Pro Ala Gly Val Val Leu Ser
 210 215 220
 His Lys Asn Val Ile Thr Asn Cys Val Gln Leu Met Ser Asp Tyr Ile

225		230		235		240
Gly Asp Ser Glu Lys Val Pro Ser Thr Pro Val Ser Trp Leu Pro Phe						
	245			250		255
Tyr His Asp Met Gly Leu Met Leu Gly Ile Ile Leu Pro Met Ile Asn						
	260			265		270
Gln Asp Thr Ala Val Leu Met Ser Pro Met Ala Phe Leu Gln Arg Pro						
	275			280		285
Ala Arg Trp Met Gln Leu Leu Ala Lys His Arg Ala Gln Ile Ser Ser						
	290			295		300
Ala Pro Asn Phe Gly Phe Glu Leu Ala Val Arg Arg Thr Ser Asp Asp						
305		310		315		320
Asp Met Ala Gly Leu Asp Leu Gly His Val Arg Thr Ile Val Thr Gly						
	325			330		335
Ala Glu Arg Val Asn Val Ala Thr Leu Arg Arg Phe Thr Glu Arg Phe						
	340			345		350
Ala Pro Phe Asn Leu Ser Glu Thr Ala Ile Arg Pro Ser Tyr Gly Leu						
	355			360		365
Ala Glu Ala Thr Val Tyr Val Ala Thr Ala Gly Pro Gly Arg Ala Pro						
	370			375		380
Lys Ser Val Cys Phe Asp Tyr Gln Gln Leu Ser Val Gly Gln Ala Lys						
385		390		395		400
Arg Ala Glu Asn Gly Ser Glu Gly Ala Asn Leu Val Ser Tyr Gly Ala						
	405			410		415
Pro Arg Ala Ser Thr Val Arg Ile Val Asp Pro Glu Thr Arg Met Glu						
	420			425		430
Asn Pro Ala Gly Thr Val Gly Glu Ile Trp Val Gln Gly Asp Asn Val						
	435			440		445
Gly Leu Gly Tyr Trp Arg Asn Pro Gln Gln Thr Glu Ala Thr Phe Arg						
	450			455		460
Ala Arg Leu Val Thr Pro Ser Pro Gly Thr Ser Glu Gly Pro Trp Leu						
	465			470		475
Arg Thr Gly Asp Leu Gly Val Ile Phe Glu Gly Glu Leu Phe Ile Thr						
	485			490		495
Gly Arg Ile Lys Glu Leu Leu Val Val Asp Gly Ala Asn His Tyr Pro						
	500			505		510
Glu Asp Ile Glu Ala Thr Ile Gln Glu Ile Thr Gly Gly Arg Val Val						
	515			520		525
Ala Ile Ala Val Pro Asp Asp Arg Thr Glu Lys Leu Val Thr Ile Ile						
	530			535		540
Glu Leu Met Lys Arg Gly Arg Thr Asp Glu Glu Glu Lys Asn Arg Leu						
545		550		555		560

Arg Thr Val Lys Arg Glu Val Ala Ser Ala Ile Ser Arg Ser His Arg
 565 570 575
 Leu Arg Val Ala Asp Val Val Met Val Ala Pro Gly Ser Ile Pro Val
 580 585 590
 Thr Thr Ser Gly Lys Val Arg Arg Ser Ala Ser Val Glu Arg Tyr Leu
 595 600 605
 His His Glu Phe Ser Arg Leu Asp Ala Met Ala
 610 615
 <210> 38
 <211> 560<212> PRT
 <213> Streptomyces verticillus
 <400> 38
 Met Ser Arg Pro Ala Gly Ile Val Asp Ile Ala Arg Arg His Ala Glu
 1 5 10 15
 Arg Thr Pro Ala Arg Pro Ala Tyr Ala Phe Leu Pro Asp Gly Glu Thr
 20 25 30
 Glu Ser Val Arg Phe Ser Phe Ala Asp Ile Asp Arg Arg Ala Arg Ala
 35 40 45
 Val Ala Ala Val Leu Gln Asp Arg Gly Leu Ala Gly Glu Arg Val Leu
 50 55 60
 Val Ala Tyr Pro Ser Gly Pro Glu Tyr Val Gln Ala Phe Leu Gly Cys
 65 70 75 80
 Leu Tyr Ala Gly Val Val Ala Val Pro Cys Asp Glu Pro Arg Ser Gly
 85 90 95
 Pro Ser Ala Glu Arg Leu Ala Gly Ile Arg Ala Asp Ala Arg Pro Ala
 100 105 110
 Leu Ala Leu Thr Ala Gly Ala Pro Glu Ala Gly Leu Ala Gly Leu Ala
 115 120 125
 Thr Leu Asp Val Ala Gly Val Pro Asp Ser Ala Ala Gly Ala Trp Thr
 130 135 140
 Asp Pro Val Ala Gly Pro Asp Ala Leu Ala Phe Leu Gln Tyr Thr Ser
 145 150 155 160
 Gly Ser Thr Arg Arg Pro Arg Gly Val Met Val Gly His Gly Asn Leu
 165 170 175
 Leu Ala Asn Glu Arg Cys Ile Ala Ala Ala Cys Gly His Asp Arg Asp
 180 185 190
 Ser Thr Phe Val Gly Trp Ala Pro Phe Phe His Asp Met Gly Leu Val
 195 200 205
 Ala Asn Leu Leu Gln Pro Leu Tyr Leu Gly Ser Leu Ser Val Leu Met
 210 215 220

Pro Pro Met Ala Phe Leu Gln Arg Pro Ala Arg Trp Leu Arg Ala Val
 225 230 235 240
 Ser Arg Tyr Arg Ala His Thr Ser Gly Gly Pro Asn Phe Ala Tyr Asp
 245 250 255
 Leu Cys Val Asp Arg Val Gly Glu Asp Glu Arg Ala Gly Leu Asp Leu
 260 265 270
 Ser Gly Trp Lys Val Ala Tyr Asn Gly Ala Glu Pro Val Arg Ala Asp
 275 280 285
 Thr Leu Arg Arg Phe Thr Asp Arg Phe Ala Pro His Gly Phe Thr Pro
 290 295 300
 Gly Ala His Phe Pro Thr Tyr Gly Leu Ala Glu Ala Thr Leu Leu Val
 305 310 315 320
 Ala Thr Gly Pro Lys Gly Val Pro Pro Arg Thr Leu Thr Ala Asp Arg
 325 330 335
 Ala Ala Leu Arg Ala Gly Arg Leu Arg Pro Ala Gly Pro Gly Glu Ala
 340 345 350
 Gly Leu Glu Leu Val Gly Asn Gly Thr Ala Gly Leu Asp Thr Thr Leu
 355 360 365
 Arg Ile Val Asp Pro Ala Thr Ala Arg Glu Cys Pro Pro Gly Glu Val
 370 375 380
 Gly Glu Val Trp Val Arg Gly Pro Gly Val Ala Arg Gly Tyr Phe Gly
 385 390 395 400
 Arg Pro Arg Glu Ser Ala Pro Leu Leu Ala Ala Arg Leu Pro Gly Gly
 405 410 415
 Glu Gly Pro Tyr Leu Arg Thr Gly Asp Leu Gly Ala Leu His Asp Gly
 420 425 430
 Glu Leu Phe Leu Thr Gly Arg His Lys Asp Leu Ile Val Ile Arg Gly
 435 440 445
 Gln Asn His His Pro His Asp Leu Glu Arg Thr Ala Glu Gln Ala His
 450 455 460
 Pro Ala Leu Arg Pro Thr Cys Ala Ala Ala Phe Ala Val Pro Gly Asp
 465 470 475 480
 Gly Ala Glu Arg Leu Val Leu Val Cys Glu Leu Thr Ser Tyr Arg Ala
 485 490 495
 Val Asp Pro Ala Ala Val Ala Glu Ala Val Arg Ala Ala Leu Ala Ala
 500 505 510
 Arg His Gly Val Ala Pro His Thr Leu Val Val Leu Arg Arg Gly Gly
 515 520 525
 Ile Pro Lys Thr Thr Ser Gly Lys Val Arg Arg Gly His Cys Arg Thr
 530 535 540
 Ala Tyr Leu Asp Gly Thr Leu Pro Val His Thr Ala Val Arg Leu Pro

275	280	285
Arg Lys Ile Ser Asp Glu Gln Lys Ala Gly Leu Asp Leu Ser Ser Trp 290 295 300		
Glu Leu Ala Phe Cys Gly Ala Glu Pro Ile Arg Pro Asp Thr Leu Glu 305 310 315 320		
Ala Phe Ser Lys Ala Phe Glu Pro Cys Gly Phe Arg Arg Glu Ala Phe 325 330 335		
Tyr Pro Cys Tyr Gly Leu Ala Glu Gly Thr Leu Ile Val Thr Gly Val 340 345 350		
Ser Lys Gly Arg Ala Ala Arg Val Glu His Phe Gln Arg Glu Ala Leu 355 360 365		
Glu Ala His Arg Ala Val Ala Ala Ser Ser Pro Gly Glu Ala Ala Arg 370 375 380		
Asp Thr Val Arg His Val Ser Cys Gly Thr Val Val Pro Asp Glu Gln 385 390 395 400		
Ile Leu Val Val Asp Pro Glu Thr Arg Thr Ala Leu Pro Pro Gly His 405 410 415		
Ile Gly Glu Ile Trp Val Arg Gly Pro Ser Val Ala Gln Gly Tyr Trp 420 425 430		
Leu Arg Pro Glu Glu Thr Ala Arg Thr Phe Gln Ala Arg Leu Ala Gly 435 440 445		
Gly Thr Glu Ala Pro Trp Leu Arg Thr Gly Asp Leu Gly Phe Leu His 450 455 460		
Asp Gly Glu Leu Phe Val Ser Gly Arg Arg Lys Asp Leu Leu Val Ile 465 470 475 480		
Arg Gly Arg Asn Tyr Tyr Pro Gln Asp Leu Glu Leu Thr Val Glu Arg 485 490 495		
Ser His Pro Ala Leu Arg Pro Gly Cys Ala Ala Val Phe Ser Val Ser 500 505 510		
Val Gly Ala Ser Glu Glu Val Val Val Val Gln Glu Val Asp Arg Arg 515 520 525		
Tyr Pro Gly Gly Asp Trp Pro Asp Val Ile Ala Ala Ile Arg Arg Asp 530 535 540		
Ile Ser Glu Gln His Ala Leu Arg Val His Ala Val Val Leu Ile Lys 545 550 555 560		
Ser Gly Ser Leu Leu Lys Thr Ser Ser Gly Lys Val Gln Arg Gly Ala 565 570 575		
Thr Arg Glu Ala Tyr Leu Glu Gly Gln Leu Asp Thr Val Ser Ala Asp 580 585 590		
Ala Ala Gln Glu Pro Val Gly Glu 595 600		

<400> 40

Ser Asn Ile Ser Asp Arg Gly Ile Arg Phe Ile Glu Ser Asp Lys Ile
20 25 30

Glu Thr Phe Val Ser Tyr Arg Gln Leu Phe Asp Glu Ala Gln Gly Phe
35 40 45

Leu Gly Tyr Leu Gln His Ile Gly Ile Gln Pro Lys Gln Glu Ile Val
50 55 60

Phe Gln Ile Gln Glu Asn Lys Ser Phe Val Val Ala Phe Trp Ala Cys
65 70 75 80

Leu Leu Gly Gly Met Ile Pro Val Pro Val Ser Ile Gly Glu Asp Asn
85 90 95

Asp His Lys Leu Lys Val Trp Arg Ile Trp Asn Ile Leu Asn Asn Pro
100 105 110

Phe Leu Leu Ala Ser Glu Thr Val Leu Asp Lys Met Lys Lys Phe Ala
115 120 125

Ala Asp His Asp Leu Gln Asp Phe His His Gln Leu Ile Glu Lys Ser
130 135 140

Asp Ile Ile Gln Asp Arg Ile Tyr Asp His Pro Ala Ser Gln Tyr Glu
145 150 155 160

Pro Glu Ala Asp Glu Leu Ala Phe Ile Gln Phe Ser Ser Gly Ser Thr
165 170 175

Gly Asp Pro Lys Gly Val Met Leu Thr His His Asn Leu Ile His Asn
180 185 190

Thr Cys Ala Ile Arg Asn Ala Leu Ala Ile Asp Leu Lys Asp Thr Leu
195 200 205

Leu Ser Trp Met Pro Leu Thr His Asp Met Gly Leu Ile Ala Cys His
210 215 220

Leu Val Pro Ala Leu Ala Gly Ile Asn Gln Asn Leu Met Pro Thr Glu
225 230 235 240

Leu Phe Ile Arg Arg Pro Ile Leu Trp Met Lys Lys Ala His Glu His
245 250 255

Lys Ala Ser Ile Leu Ser Ser Pro Asn Phe Gly Tyr Asn Tyr Phe Leu
260 265 270

Lys Phe Leu Lys Asp Asn Lys Ser Tyr Asp Trp Asp Leu Ser His Ile
280 285

275

Arg Val Ile Ala Asn Gly Ala Glu Pro Ile Leu Pro Glu Leu Cys Asp
 290 295 300
 Glu Phe Leu Thr Arg Cys Ala Ala Phe Asn Met Lys Arg Ser Ala Ile
 305 310 315 320
 Leu Asn Val Tyr Gly Leu Ala Glu Ala Ser Val Gly Ala Thr Phe Ser
 325 330 335
 Asn Ile Gly Glu Arg Phe Val Pro Val Tyr Leu His Arg Asp His Leu
 340 345 350
 Asn Leu Gly Glu Arg Ala Val Glu Val Ser Lys Glu Asp Gln Asn Cys
 355 360 365
 Ala Ser Phe Val Glu Val Gly Lys Pro Ile Asp Tyr Cys Gln Ile Arg
 370 375 380
 Ile Cys Asn Glu Ala Asn Glu Gly Leu Glu Asp Gly Phe Ile Gly His
 385 390 395 400
 Ile Gln Ile Lys Gly Glu Asn Val Thr Gln Gly Tyr Tyr Asn Asn Pro
 405 410 415
 Glu Ser Thr Asn Arg Ala Leu Thr Pro Asp Gly Trp Val Lys Thr Gly
 420 425 430
 Asp Leu Gly Phe Ile Arg Lys Gly Asn Leu Val Val Thr Gly Arg Glu
 435 440 445
 Lys Asp Ile Ile Phe Val Asn Gly Lys Asn Val Tyr Pro His Asp Ile
 450 455 460
 Glu Arg Val Ala Ile Glu Leu Glu Ile Asp Leu Gly Arg Val Ala Ala
 465 470 475 480
 Cys Gly Val Tyr Asp Gln Glu Thr Arg Ser Arg Glu Ile Val Leu Phe
 485 490 495
 Ala Val Tyr Lys Lys Ser Ala Asp Arg Phe Ala Pro Leu Val Lys Asp
 500 505 510
 Ile Lys Lys His Leu Tyr Gln Arg Gly Gly Trp Ser Ile Lys Glu Ile
 515 520 525
 Leu Pro Ile Arg Lys Leu Pro Lys Thr Thr Ser Gly Lys Val Lys Arg
 530 535 540
 Tyr Glu Leu Ala Glu Gln Tyr Glu Ser Gly Lys Phe Ala Leu Glu Ser
 545 550 555 560
 Thr Lys Ile Lys Glu Phe Leu Glu Gly
 565

<210> 41
 <211> 56
 <212> PRT
 <213> bacteria
 <400> 41

Leu Val Glu Asp Asp Asp Gly Ala Ala Leu Ile Asp Thr Gly Phe Thr
 1 5 10 15

Ala Pro Ala Ala Lys Ala Leu Leu Arg Leu Leu Lys Asp Gly Gly Lys
 20 25 30

Lys Ile Asp Ala Ile Ile Leu Thr His Ala His Ala Asp His Ile Gly
 35 40 45

Gly Val Pro Glu Leu Leu Glu Arg
 50 55

<210> 42

<211> 58

<212> PRT

<213> Stenophomonas maltophilia

<400> 42

Leu Val Gln Thr Pro Asp Gly Ala Val Leu Leu Asp Gly Gly Met Pro
 1 5 10 15

Gln Met Ala Ser His Leu Leu Asp Asn Met Lys Ala Arg Gly Val Thr
 20 25 30

Pro Arg Asp Leu Arg Leu Ile Leu Leu Ser His Ala His Ala Asp His
 35 40 45

Ala Gly Pro Val Ala Glu Leu Lys Arg Arg
 50 55

<210> 43

<211> 52

<212> PRT

<213> bacteria

<400> 43

Asp Pro Glu Arg Phe Leu Asp Glu Asn Gly Lys Phe Lys Lys Ser Tyr
 1 5 10 15

Ala Phe Leu Pro Phe Gly Ala Gly Pro Arg Asn Cys Leu Gly Glu Arg
 20 25 30

Leu Ala Arg Met Glu Leu Phe Leu Phe Leu Ala Thr Leu Leu Gln Arg
 35 40 45

Phe Glu Leu Glu
 50

<210> 44

<211> 7

<212> PRT

<213> unknown

<220>

<223> X may be replaced by any amino acid

<220>

<221> X

<222> (1)..(7)
<223> unknown

<400> 44

His His Xaa Xaa Xaa Asp Gly
1 5

<210> 45
<211> 31
<212> DNA
<213> unknown

<220>
<223> unknown

<400> 45
cacacagaat tcaccagcgc cactcgcgct t

31

<210> 46
<211> 30
<212> DNA
<213> unknown

<220>
<223> unknown

<400> 46
cacacatcga tgggcaacgc cgatcagccg

30